

M.C.Z.-L

Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
Vol. LXXIX, No. 9

SCIENTIFIC RESULTS OF AN EXPEDITION
TO RAIN FOREST REGIONS IN EASTERN AFRICA

IX
ZOÖGEOGRAPHY AND ITINERARY

BY ARTHUR LOVERIDGE

WITH FOUR PLATES

The Library
Museum of Comparative Zoology
Harvard University

CAMBRIDGE, MASS., U.S.A.
PRINTED FOR THE MUSEUM
OCTOBER, 1937

No. 9. — *Reports on the Scientific Results of an Expedition to Rain
Forest Regions in Eastern Africa*

IX

Zoögeography and Itinerary

BY ARTHUR LOVERIDGE

INTRODUCTION

GENERAL REMARKS

The Expedition, upon the results of which this paper forms the concluding report, was undertaken by the author as a Fellow of the John Simon Guggenheim Memorial Foundation.

The object in view was a clarification and extension of our knowledge regarding the distribution of the isolated, sylvicoline forms of life associated with the forest 'islands' of East Africa. In addition, an attempt has been made towards further elucidation of their relationship with the fauna of the great West African forests, particularly that of the Cameroon Mountains.

In this respect the work must be regarded as an extension of a programme outlined in 1924. This resulted in a visit to the forests of the Usambara and Uluguru Mountains of eastern Tanganyika Territory in 1926-1927, and those of the Uzungwe, Ukinga, Rungwe and Poroto Mountains in southwestern Tanganyika in 1929-1930.

The principal conclusions resulting from these trips were embodied in various reports such as "A Comparative Study of the Herpetological Faunae of the Uluguru and Usambara Mountains.¹" and the "Introduction and Zoögeography" to "Reports on the Scientific Results of an Expedition to the Southwestern Highlands of Tanganyika Territory."²

The latter paper, in particular, outlines (p. 27) the main points connected with the discontinuity of the distribution of wild life persisting in the remnants of primeval forest surviving on East African mountains, gives percentages of genera and species regarded as common to the Cameroon Mountains, and contains other pertinent matter which need not, therefore, be repeated here.

The Expedition of 1933-1934 consisted of the author, his gunbearer, and two native skinners. On this occasion forested areas lying to the

¹ Barbour and Loveridge, 1928, *Mem. Mus. Comp. Zoöl.*, **50**, pp. 87-265, pls. i-iv.

² Loveridge, 1933, *Bull., Mus. Comp. Zoöl.*, **75**, pp. 1-43, pls. i-iii.

northwest and north of the Usambara Mountains, were selected. The principal ones being Mounts Debasiën (Kadam) and Elgon (Masaba) in Uganda, the Kakamega Forest at Kaimosi, and Mount Mbololo in Teita,¹ Kenya Colony. In addition many relic patches were visited as set forth in the itinerary given on pages 506-539 of the present paper.

In my 1933 report it was postulated that the amphibia, being of more sedentary habits and restricted in their migrations by their ecological necessities, were the most promising group of vertebrates from which to collect data that might throw light on this problem. In equatorial Africa, however, where there is an alternation of dry and wet seasons, the probability of one's finding frogs in the middle of the dry season is but slightly better than the likelihood of encountering them in New England in midwinter. With this in mind, the trip was planned so as to include and take advantage of both the "small" October-November rains of eastern Uganda, as well as the "big" monsoon rains of May and June on the Kenya coast.

Unfortunately Central Africa did not escape the extensive drought which, in 1933, assumed almost world-wide proportions. This drought adversely affected amphibian emergence during the first four months of the expedition. For example, at Kaimosi, which is in the region of the heaviest rainfall in Kenya, averaging 74.16 inches, and where records have been kept for thirty years, the millpond was lower than at any time during the three decades. Had not some showers occurred towards the end of February one wonders if our amphibian record would not have been as poor as that for Mounts Debasiën and Elgon.

So severe was this East African drought that it formed a subject of discussion in the House of Commons. Sir Philip Cunliffe-Lister then stated that between January and April the Government spent £6,500 for famine relief in the Coast Province of Kenya alone. ("East Africa," 17. v. 34.)

When the big rains broke at last at the coast, they were exceptionally heavy, twenty inches *above* the normal falling during the months of April, May and June. Nor was this merely a local phenomenon of the Tana region, where I was at the time, for in the south the Zambezi was higher than within living memory, rising 77 feet in the gorge to a total depth of 135 feet. In the north the Nile flood reached its highest in forty years, inundating many small villages and towns as well as the northern and southern suburbs of Cairo. ("Times Weekly," London, 13. ix. 34.)

¹ The alternative of Taita, long in use by Zoölogists, was employed in the taxonomic reports, but should give way to Teita as it is the form adopted by the Government of Kenya.

DEFORESTATION AND EROSION

Rainfall, deforestation and erosion are so inseparably bound up with the whole problem of the survival of the sylvicoline fauna that it would appear appropriate to make some remarks on the subject at this point.

The tragic results of uncontrolled agricultural development and overstocking, recently culminating in the creation of the so-called 'dust bowl' in the middle western United States, is an object lesson which should not go unheeded in Eastern Africa. It must be remembered that these dire consequences have supervened after less than a century of exploitation of the land.

Owing to the unparalleled developments which have been taking place in East Africa during the last thirty years, extensive areas have undergone deforestation with the consequent disappearance of the specialized fauna inhabiting them. Only recently a conchologist of wide African experience told me how he had landed on a certain island in Lake Kivu in search of a species of snail known only from there. The virgin forest, which once clothed the island, had been destroyed to make way for coffee plantations. The slump in coffee prices had resulted in the virtual abandonment of the plantations. Not a living snail could be found, however, nothing but a few dead shells—the new conditions were inimical to the survival of the species.

The Teita porters who carried my loads up the almost precipitous ascent of Mount Mbololo, told me that they could remember when forest clothed the mountain side. Today only about a thousand acres of it survive as a narrow strip, two or three miles in length, running along the hog-backed ridge at 4,800 feet. This relic patch appeared to vary from one to two hundred yards in width. It is now under the protection of the Forestry Department of Kenya.

Though the plains below lay baking in sunshine by day, almost nightly during our stay fog or mist collected about the magnificent, though pitiful, remnant of forest. There it condensed in so heavy a precipitation that the drops fell like rain upon the tent, continuing to do so until several hours after sunrise the following morning. Before 8 A.M., a walk through the grass fringing the forest would leave one soaked. When digging for caecilians in the rich leaf mould of the forest floor, we always found the ground sodden. In the cool depths of the forest it was damp and pleasant throughout the day, however trying the heat and glare might be a few hundred yards outside.

Below the forest, the steeper slopes were strewn with rocks which protruded like the bare bones of the mountain through the scanty

covering of gravel which remained. Lower down, stunted scrub, a few scattered trees and sparse grass testified to the poverty of what little soil remained. Nevertheless, here and there were ravines where little marshes were fed by a trickle of water coming from a spring among the inhospitable rocks. Undoubtedly this water had percolated through from the forest above.

Recently the United States Forest Service has published data, obtained by actual measurement, bearing upon the protection from floods which is afforded by the action of forests in conserving the run off. There it is shown that forest soil in the Ohio Valley absorbs 50 times more water than does exposed earth, being 15 to 30 times more porous than field soil. Pasture land retains only a third to a twentieth of the amount which would be absorbed by an equal area of forest floor.

Thirty years ago Robin Kemp made a wonderful collection of small mammals on the southeast face of Mount Elgon. When I visited the locality in 1934, I found conditions very different from those which I anticipated in view of the species which he had encountered there in 1909. I therefore wrote to Mr. Kemp as follows: ". . . last year I camped half a mile above the cave which the natives still remember your having occupied. Could you tell me what the slopes were clothed with at the time of your visit? Today, as the result of annual burning, there is only thorn scrub and thicket with a few scattered baobabs, except along the upper reaches of the stream below the falls where a little rain forest still persists." I might have added that great gulleys had been cut by the run off through the already semi-arid foothills lying between the escarpment and Bukori. In his most interesting reply to my letter, Mr. Kemp says: "The stream in those days was very much hidden. The whole ravine in front of the cave — from the Kirui plain upwards to as far as I climbed in the ravine — was a dense mass of green timbered virgin forest. I do not remember any sign of fire damage either along the bottom or along the tops of the trees."

One feels that the changes which the region is undergoing impress themselves more forcefully on those who, like myself, revisit places after lengthy intervals. That certain settlers are alive to the dangers threatening, is evidenced by the formation of such organizations as the Soil Erosion Sub-Committee of the Subukia Farmers' Association. Mr. D. N. Stafford, in an address to the Uganda Planters' Association, remarked that: "The Kampala-Entebbe Road was once the pride of the country, the admiration of every visitor. Today most of the forest has been ruthlessly destroyed, and the beauty patches have dis-

appeared. What has happened on this road is going on in every road in Buganda." ("East Africa," 2. viii. 34.)

The regional governments have all sponsored investigations into one phase or another of the subject. In Tanganyika, Dr. E. O. Teale and Mr. C. Gillman recently issued their report on the menace to the future water supplies in the Northern Province. These authors state that some of the areas which they visited were already beyond hope of reclamation, and they urge prompt action as vitally necessary to save others which are threatened. Expensive as preventive measures often are, yet it is infinitely more economical than moving populations which may ultimately be the only alternative.

Of Nyasaland, Mr. A. W. J. Hornby writes: "Owing to the denudation of woodland areas, the gradual destruction of forest, and sudden floods, the country can be said now to be incapable of supporting half the population it did a hundred years ago." (1934, Nyasaland Bulletin, No. 11.)

Mr. E. J. Wayland, Director of Geological Survey in Uganda, states that the country, in common with many other parts of Africa, is drying up. A few years ago the influence of forests on climate and water supply in Uganda and Kenya was discussed at length by Mr. J. W. Nicholson, who visited East Africa at the request of the respective governments. In the report published by the Kenya Forest Department, this investigator states (1929, p. 35): "There is a great deal of evidence hydrological, geological and botanical, to show that parts of Africa are undergoing progressive desiccation. . . . There is some evidence to show that parts of Kenya and Uganda (*e.g.* Karamoja — Lake Rudolf) are in course of drying up." More pertinent, however, is "Our third conclusion is that under favourable circumstances mountain forests in East Africa can induce occult precipitation up to at least 25 per cent of the total annual rainfall." (p. 17.)

As a result of Mr. Nicholson's findings, the remaining patch of forest on Mount Debasien, in arid Karamoja, is being very strictly preserved. The measures taken included the moving of several native families who had squatted in the forest. On the western slopes of Elgon above Sipi, however, we found that the Bagishu were making heavy inroads into the forest, whether legally or illegally I did not ascertain; at least it was being done.

In so far as natives are concerned, the governments face a difficult problem with an expanding population. With a view to enlightening and instructing them, the Bantu Educational Committee has prepared a film on soil erosion, its causes and prevention. Native conservatism

will be difficult to combat and not many Governors speak so frankly as did Sir Harold MacMichael when addressing a gathering of 8,000 natives at Lushoto in the Usambara Mountains, in September, 1935. He charged them with the haphazard destruction of timber and the reckless wastage of a valuable heritage upon which their descendents would be dependent for a living.

Deforestation continues at this moment, and is likely to do so until an enlightened public, both native and European, supports the efforts of the Forest Departments in their arduous task of conservation. In so far as saving the sylvicoline fauna is involved, replanting appears useless, for, with a few exceptions, the forest-dwelling lower vertebrates do not adapt themselves to the types of trees (gums, wattle, etc.) which are so largely employed in replanting operations.¹

ZOÖGEOGRAPHY

ECOLOGICAL LIFE ZONES

It would appear that sufficient collecting has been done in East Africa to justify us in attempting to assign the herpetofauna to life zones with such a reasonable degree of accuracy that it should leave little room for criticism or the necessity for much future adjustment.

The most important contribution to an understanding of the distribution of African reptiles has been given by Schmidt (1923, pp. 4-45), though an increase in our knowledge in the years that have elapsed since the appearance of this paper, inevitably necessitates some amendment, and even difference of opinion. For an exhaustively detailed, first-hand account of the ecological habitats of the amphibia, one could not wish for a more interesting one than that of Sanderson (1936, pp. 165-187) dealing with an area in the Cameroons. In respect to certain collections from British Somaliland, northern Kenya, Angola and South West Africa, Parker (1932a, 1932b, 1936a, 1936b) has allocated his material to certain groupings which, though suitable for the regions in question, are neither wholly applicable nor adequate for the present area and purpose.

This area, embracing Kenya, Uganda, Tanganyika and Zanzibar, is referable to the Eastern and Southern Subprovince of the Ethiopian

¹Since this paper was written a year ago, much has happened. Of particular interest was the announcement in July, 1937 by His Excellency, the Governor of Kenya, that the Government was planning to initiate an extensive scheme of preventive measures aiming to check further erosion ("East Africa and Rhodesia," 29, vii. 37.)

Province as defined for botany by Engler. The herpetofauna of the area conveniently falls into nine ecological life zones of which the coastal merges into the savanna and the latter into the upland, though to a less extent.

Most writers have been embarrassed by the ubiquitous, widespread species that occur in several habitats, the usual practice has been to assign them to a separate group (Parker, 1932a, p. 213). This practice, however, has the disadvantage of giving an incomplete picture of the fauna of the separate zones. In the present paper, therefore, I have adopted the course of repeating immediately after the name of each species, the numbers of the other zones in which it occurs should it inhabit several.

Even so, exceptions were made in the case of the Northern Desert Zone which was created for a special purpose, and again for the Forest-edge Zone where most of the true forest species might supposedly be encountered at times. The inclusion of their names would result in unnecessary repetition.

Perhaps it would be as well to remind readers that the life zones to which the species are assigned are those that they occupy in East Africa. It is conceivable that in other regions they may be found at very different elevations. As a case in point, I imagine that in South Africa such snakes as *Pseudaspis*, *Duberria*, and *Trimerorhinus* are by no means restricted to grassy uplands about and above 5,000 feet.

For the benefit of those who are interested in the grouping of the virile, ubiquitous types referred to above, I list below as representative of the most adaptable species of the Ethiopian herpetofauna, most of those which occur in three or more of the zones here adopted.

<i>Crocodylus niloticus</i>	<i>Dasypeltis scaber</i>
	<i>Thelotornis kirtlandii</i>
<i>Pelomedusa galeata</i>	<i>Dispholidus typus</i>
<i>Pelusios n. nigricans</i>	<i>Calamelaps unicolor</i>
	<i>Causus resimus</i>
<i>Varanus niloticus</i>	<i>Causus defilippi</i>
<i>Mabuya maculilabris</i>	
<i>Mabuya megalura</i>	<i>Bufo r. regularis</i>
<i>Mabuya v. varia</i>	<i>Rana g. bravana</i>
<i>Brookesia k. kersteni</i>	<i>Rana f. angolensis</i>
	<i>Rana o. oxyrhynchus</i>
<i>Python sebae</i>	<i>Rana m. mascareniensis</i>
<i>Natrix o. olivacea</i>	<i>Arthroleptis minutus</i>
<i>Boaedon lineatus</i>	<i>Phrynobatrachus acridoides</i>
<i>Chlorophis neglectus</i>	<i>Phrynobatrachus natalensis</i>

The fact that Parker (1936a, p. 118), when dealing with the Angolan fauna, also includes *Hemidactylus mabouia*, *Gerrhosaurus flavigularis*, *Chamaeleo dilepis* and *Causus rhombeatus*, is not indicative of any difference of opinion regarding them, but results from the difference of the zoning employed. In the east these reptiles are restricted to the coast and savanna zones, though possibly *dilepis* might be included with the forest-edge group of chameleons. The point is a very minor one.

LIST OF THE LIFE ZONES ADOPTED IN THIS PAPER

1. Marine.	Sea level.
2. Freshwater Rivers, Lakes and Swamps.	<i>circa</i> 1- 5,000 feet.
3. Littoral Rocks.	<i>circa</i> 1- 10 feet.
4. Northern Desert.	<i>circa</i> 1,000- 3,000 feet.
5. Coastal Plain.	<i>circa</i> 10- 1,000 feet.
6. Upland Savanna	<i>circa</i> 1,000- 6,000 feet.
7. Grassy Uplands and Alpine Meadows.	<i>circa</i> 5,000-12,000 feet.
8. Forest-edge.	<i>circa</i> 3,000-10,000 feet.
9. Rain Forest, usually Montane.	<i>circa</i> 3,000-10,000 feet.

Zone 1. *Marine*

The wholly marine reptiles resident in the Indian Ocean off the East African coast, consist of four turtles (with the possible addition of the recently described *Caretta gigas* Deraniyagala, if recognizable) and a sea snake. I am unaware of any definite, specifically-localized records of the taking of the luth (*D. coriacea*) or brown and yellow sea snake (*P. platurus*) on the coast, though both are known to occur not far off.

Dermochelys coriacea
Eretmochelys imbricata
Chelonia mydas

Caretta caretta olivacea
Pelamis platurus

Zone 2. *Freshwater Rivers, Lakes and Swamps*

In this group we have a number of species whose life is conditioned wholly, or in part, by the presence of water, at least during a portion of the year. Among those reptiles for whose semi-aquatic habits water is essential, are the crocodiles, terrapin, soft-shelled tortoises and two species of snakes. By zoning them on this basis, we immediately eliminate the difficulty of the widespread distribution of many species, for it is the presence of water that governs their distribution, rather

than whether that water flows through coastal plain, savanna, grassy upland, or forest.

Schmidt (1919, p. 401) has attempted to separate the African chelonians according as to whether they occur within or without the forest: the exceptions, however, form a considerable percentage of the whole.

The lizards and snakes listed are species which dwell on the borders of streams and swamps, principally on account of their diet which, in so far as most of the snakes are concerned, is one of frogs and fish. The water cobra (*B. a. stormsi*) spends its days in the waters of Lake Tanganyika. The species of *Grayia* are only slightly less amphibious. The limbless *Melanoseps*, which may be really a rain-forest skink, appears to be surviving only where conditions are sufficiently moist for burrowing. On the plains such an environment was found in gallery forest along the Mkata River; in the Uluguru Mountains beside a waterfall whose spray kept the site moist; near a patch of forest on grass-grown uplands, yet another was found in sandy soil among the rotting roots of an old stump on the bank of a watercourse.

Among the amphibia, the caecilian (*D. gregorii*) is outstandingly conspicuous as a burrower in deep mud on the banks of the Tana River and beneath the waters of Lake Peccatoni. In this respect its environment is sharply distinguished from that of its rain-forest relatives, though a moist and permeable soil appears essential to both.

While it is true that the majority of frogs and toads require ponds or swamps in which to spawn during some part of the year, many are capable of existing under arid savanna conditions for many months at a time. Below are listed only those species for whom ponds and swamps seem so essential an element of their habitat that they naturally fall under this heading.

Crocodylus cataphractus in 6.

Crocodylus niloticus in 5, 6.

Pelomedusa galeata in 5, 6.

Pelusios sinuatus in 5, 6.

Pelusios n. nigricans in 5, 6, 9.

Pelusios derbianus (doubtful) 9.

Trionyx triunguis in 6, 9.

Cycloderma frenatum in 6.

Varanus niloticus in 3, 5, 6.

Melanoseps ater in 5, 6, 7, 9.

Python sebae in 5, 6, 9.

Natrix o. olivacea in 5, 6.

Glypholytus bicolor in 6.

Chlorophis hoplogaster in 6, 9.

Chlorophis neglectus in 5, 6, 9.

Chlorophis irregularis in 6, 9.

Grayia smythii in 6, 9.

Grayia tholloni in 6, 9.

Boulengerina a. stormsi in 6.

Dermophis gregorii in 5.

<i>Xenopus l. petersii</i> in 6.	<i>Hyperolius</i> spp. in 5, 6, 7, 9.
<i>Xenopus l. victorianus</i> in 6.	<i>Rana g. bravana</i> in 5, 6.
<i>Xenopus l. bunyoniensis</i> in 7.	<i>Rana f. angolensis</i> in 6, 7.
<i>Xenopus l. borealis</i> in 6.	<i>Rana o. oxyrhynchus</i> in 5, 6, 7.
<i>Xenopus muelleri</i> in 5, 6.	<i>Rana m. mascareniensis</i> in 5, 6, 7.
<i>Xenopus clivii</i> in 4.	<i>Rana stenocephala</i> in 6.
<i>Megalixalus fornasinii</i> in 5, 6.	<i>Rana occipitalis</i> in 6.
<i>Megalixalus dorsalis</i> in 6.	<i>Arthroleptis</i> spp. in 5, 6, 7, 9.
<i>Megalixalus fulvovittatus</i> in 6.	<i>Phrynobatrachus acridoides</i> in 5, 6, 7.
<i>Megalixalus brachynemesis</i> in 5, 6.	<i>Phrynobatrachus natalensis</i> in 5, 6, 7.
<i>Megalixalus flavomaculatus</i> in 5.	

Zone 3. Littoral Rocks

The little skink which is listed below, enjoys the distinction of being exclusively an inhabitant of the littoral limestone or coral rag. In this situation, at times splashed by ocean breakers, it seeks its prey — the smaller crustacea.

Where the rocks are more or less overgrown with vegetation, one frequently encounters monitors, chiefly the eyed species, for the Nilotic monitor seldom strays far from the river estuaries. Both of these big lizards enjoy an extensive inland range.

Varanus ocellatus also 5, 6.

Varanus niloticus also 2, 5, 6.

Ablepharus b. africanus

Zone 4. Northern Desert

This zoning coincides with Parker's (1932b, p. 214) group IV of "Species endemic in the Somaliland region, sometimes extending into Kenya." While it contains three times the number of species listed by him as represented in the collection with which he was dealing, I imagine that we would be in entire agreement as to its composition.

Buxton (1937, p. 85) in a most interesting account of this region, with which I am personally unacquainted, prefers "semi-desert" for the area as a whole. In his article will be found an excellent detailed account of its physiographic, floral and faunistic aspects.

In northern Kenya Colony, from the Ethiopian and Somaliland boundary southwards to the equator, and just past it at Njoro, there is to be found a southward extension of desert life accompanying the slowly encroaching desert. Only 2 of the 15 forms listed have been taken south of this area. The single example of *H. citernii* found by me on a dump outside the lines of the King's African Rifles at Nairobi,

shortly after the return of a contingent from the north, was undoubtedly introduced. The second species, *E. neumanni*, described from just north of Lake Stephanie, was found to be firmly established at Ngatana, on the north bank of the Tana River, just south of 2° latitude. It is possible, therefore, that this species belongs to the coastal fauna rather than to that of the northern desert.

From Mount Longido in northern Tanganyika, northwards through Voi, we find a second desiccating area, largely on red laterite, which seems to be developing a somewhat similar fauna. However, the latter merges with that of the adjacent drier savanna areas to such an extent that its separation would result in extensive duplication. Species characteristic of this arid laterite region are listed separately and with the other savanna species of Zone 6 to which they belong.

In his first paper on the herpetofauna of the East African Lake region, Parker (1932b, p. 213) refers *Lygodactylus p. gutturalis* to his Group I comprised of "‘Eremian’ species, *i. e.* those found in Africa north of about the 10th parallel (north), Arabia, or both, and not extending southeast into Kenya." The latter part of this definition referring to Kenya would appear to be a *lapsus*, for on page 223 he records examples from Baringo and the Turkana Plains in Kenya. The position is somewhat clarified by his later (1936b, p. 602) describing of the race *keniensis* to which they would be referred. However, *L. p. gutturalis*, as I understand it, extends from its type locality Bissao, Portuguese Guinea, east to Uganda (Mbale, Karamoja, etc.) and southwards to Ujiji, Lake Tanganyika. I recently separated the Sudanese geckos under the name of *L. p. sudanensis*.

The saw-scaled viper (*Echis carinatus*) is likewise placed in his group of ‘Eremian’ species, though on p. 221 of the same paper, Parker records it from the mouth of the Kaliokwel River, *i. e.* about the 3rd parallel (north), and it has been recorded from this same general region by both Boulenger and myself.

<i>Hemidactylus ruspolii</i>	<i>Philochortus i. rudolfensis</i>
<i>Hemidactylus macropholis</i>	<i>Leptotyphlops fiechteri</i>
<i>Hemidactylus citernii</i> (see above)	<i>Coluber florulentus</i>
<i>Hemidactylus isolepis</i>	<i>Coluber smithi</i>
<i>Lygodactylus p. keniensis</i>	<i>Coluber keniensis</i>
<i>Agama r. occidentalis</i>	<i>Echis carinatus</i>
<i>Eremias neumanni</i> also 5.	
<i>Eremias smithi</i>	<i>Xenopus clivii</i>
<i>Eremias striata</i>	

Zone 5. Coastal Plain or Belt

The hot and humid coastal plain varies considerably in width though its altitude may be assessed as usually well under a 1,000 feet. Along the Tana River valley of Kenya its inland extension is as much as 150 miles, and almost as far along the line of the Central Railway in Tanganyika to Morogoro. On the other hand we find localities near to the coast, such as Amani at 3,000 feet in the Usambara Mountains, which indubitably belong to the forest zone.

While there is an interesting coastal fauna restricted to the palm-bearing, sandy plain in close proximity to the ocean, this region is principally populated by a far larger group with a high percentage of cosmopolitan species whose headquarters are the savanna. The first group is represented by a score of species,¹ half of which are burrowing, while there are nearly five times as many forms in the second.

From this it will be seen that ecological conditions in these two zones — the coast and savanna — often approximate, and coastal forms may find congenial conditions of life in a hot and humid montane valley even though it may exceed the 1,000 foot level. Nyange, in the Uluguru Mountains, provides just such conditions though its surrounding forest-clad heights support a forest fauna.

Fourteen reptiles, mostly snakes with a wide distribution, find conditions in patches of coastal bush and forest not too far removed from rain-forest conditions to prevent their occurrence in both habitats. Sternfeld's astonishing record of *Miodon gabonensis* from Dar es Salaam, is, however, omitted pending confirmation.

<i>Crocodylus niloticus</i> also 2, 6.	<i>Hemidactylus frenatus</i> (introduced)
<i>Testudo p. babcocki</i> also 6.	<i>Hemidactylus w. werneri</i> also 6.
<i>Testudo tornieri</i> also 6.	<i>Hemidactylus t. squamulatus</i> also 6.
<i>Kinixys spekii</i> also 6.	<i>Bunocnemis modestus</i>
<i>Pelomedusa galeata</i> also 2, 6.	<i>Lygodactylus grotei</i> also 6.
<i>Pelusios sinuatus</i> also 2, 6.	<i>Lygodactylus p. mombasicus</i> also 6.
<i>Pelusios n. nigricans</i> also 2, 6, 9.	<i>Lygodactylus p. picturatus</i> also 6.
<i>*Diplodactylus wolterstorffi.</i>	<i>*Platypholis f. fasciata</i>
<i>Hemidactylus brookii</i> also 6.	<i>*Phelsuma laticauda</i> (introduced)
<i>Hemidactylus parkeri</i> (insular)	<i>Agama m. mossambica</i>
<i>Hemidactylus mabouia</i> also 6.	<i>Agama a. lionotus</i> also 6.
<i>*Hemidactylus persimilis</i>	<i>Agama atricollis</i> also 6.
<i>Hemidactylus mandanus</i> (insular)	<i>Zonurus tropidosternum</i> also 6.
	<i>Varanus albigularis</i> also 6.
	<i>Varanus ocellatus</i> also 3, 6.

¹ Such are indicated by an asterisk in the following list.

- Varanus niloticus* also 2, 3, 6.
 **Chirindia ewerbecki*
 **Amphisbaenula orientalis* (? distinct)
Eremias neumanni also 4.
Eremias s. spekii also 6.
Eremias s. sextaeniata also 6.
 **Gastropholis vittata*
Gerrhosaurus m. major also 6.
Gerrhosaurus f. flavigularis also 6.
Mabuya maculilabris also 6, 9.
Mabuya planifrons also 6.
Mabuya brevicollis also 6.
Mabuya megalura also 6, 7.
Mabuya v. varia also 6, 7.
Mabuya striata also 6.
Riopa mabuiiformis
Riopa tanae
Riopa sundevallii also 6.
Riopa m. modestum also 6.
Riopa pambanum
Ablepharus wahlbergii also 6.
Scelotes tetradactyla also 9.
Melanoseps ater also 2, 6, 7, 9.
 **Scolecoseps acontias*
Chamaeleon d. roperi also 6.
Chamaeleon d. quilensis also 6.
Chamaeleon d. dilepis also 6.
Brookesia brevicaudata also 6, 8.
Brookesia k. kersteni also 6, 8.

Leptotyphlops conjuncta also 6.
Leptotyphlops emini also 6.
 **Leptotyphlops boulengeri* (insular)
 **Leptotyphlops longicauda*
 **Typhlops lumbriciformis*
 **Typhlops braminus* (introduced)
 **Typhlops pallidus*
 **Typhlops u. unitaeniatus*
 **Typhlops platyrhynchus*
Typhlops s. mucruso also 6.
Python sebae also 2, 6, 9.
Natrix o. olivacea also 2, 6.
Natrix o. pambanum (insular)
Boaedon lineatus also 6, 9.
 **Lycophidion c. acutirostre* (insular)
- Mehelya c. chanleri* also 6.
Mehelya nyassae also 6.
Chlorohis neglectus also 2, 6, 9.
Philothamnus s. semivariatus also 6, 9.
Coronella coronata also 6.
Coronella s. semiornata also 6.
Prosymna a. stuhlmanni also 6.
Scaphiophis albopunctatus also 6.
Dasypeltis scaber also 6, 9.
Tarbophis s. semiannulatus also 6.
Tarbophis guentheri
Crotaphopeltis h. hotamboeia also 6.
Chamaetortus aulicus also 6.
Hemirhagerrhis kelleri
Rhamphiophis rostratus also 6.
Rhamphiophis rubropunctatus also 6.
Psammophis punctulatus also 6.
Psammophis sibilans also 6.
Psammophis subtaeniatus also 6.
Psammophis biseriatus also 6.
Psammophis angolensis also 6.
Thelotornis kirtlandii also 6, 9.
Dispholidus typus also 6, 9.
Calamelaps unicolor also 6, 9.
Micrelaps bicoloratus also 6.
Aparallactus turneri
Aparallactus concolor also 6.
Aparallactus uluguruensis also 9.
Naja nigricollis also 6.
Dendraspis angusticeps also 6.
Causus resimus also 6, 9.
Causus defilippi also 6, 9.
Vipera superciliaris also 6.
Bitis arietans also 6.
Atractaspis bibronii also 6.
Atractaspis microlepidota also 6.

Dermophis gregorii also 2.
Hypogeophis guentheri (insular)
Boulengerula changamwensis

Xenopus muelleri also 2, 6.
Bufo r. regularis also 6, 7, 9.
 **Bufo steindachnerii*

- Chiromantis p. petersii* also 6.
Chiromantis xerampelina also 6.
 **Leptopelis concolor*
 **Hylambates maculatus*
Kassina senegalensis also 6.
Megalixalus fornasinii also 2, 6.
Megalixalus brachynemesis also 2, 6.
Megalixalus flavomaculatus also 2.
Hyperolius spp. (about thirty)
Rana g. bravana also 2, 6.
Rana floweri also 6.
Rana o. oxyrhynchus also 2, 6, 7.
Rana m. mascareniensis also 2, 6, 7.
- Rana edulis* also 6.
Rana d. delalandii also 6.
Arthroleptis s. stenodactylus also 6.
Arthroleptis minutus also 6, 7.
Phrynobatrachus acridoides also 2, 6, 7.
Phrynobatrachus natalensis also 2, 6, 7.
Hemisis m. marmoratum also 6.
Breviceps mossambicus also 6.
Spelaeophryne methneri also 6.
Phrynomerus bifasciatus also 6.

Zone 6. Upland Savanna

The term savanna is used here in the rather broad phytogeographic sense of a tropical grassland containing scattered trees of a xerophilous type, locally known as 'miombo.' In this dry woodland *Brachystegia* and *Pterocarpus* are dominant with here and there a giant baobab. During the long dry season much of this country desiccates to such a degree that it can best be described as desert. In its more arid stretches dense thickets or scattered thorn bush prevail.

Such a type of country reaches its extreme in the Taru Desert area. As already mentioned when discussing the Northern Desert zone, we find a rather characteristic group of species inhabiting this arid laterite region which extends from Voi in Kenya to Kilimanjaro and Mount Longido in northern Tanganyika. The following are typical of this red soil country, to which they are apparently largely restricted.

- Agama r. septentrionalis*
Geocalamus spp.
Eryx c. loveridgei
Coronella s. fuscrosea
Dasyplettis scaber (red phase)
- Rhamphiophis rubropunctatus*
Dispholidus typus (red phase)
Rhinocalamus dimidiatus ?
Micrelaps bicolor
Naja n. nigricollis (red phase)

R. dimidiatus is only known from Mpwapwa considerably to the south but may be confidently looked for in the northern area. All these species are referred to the Upland Savanna zone for the reasons already stated.

A second subgroup comprising some tortoises, the agamas, zonuress and a couple of skinks, centre round the small rocky hills, denuded of soil by erosion, which are quite characteristic of the savanna.

It will be noted that I refer *Ichnotropis bivittata* to this group for I have encountered it in the hot and dry woodland savanna east of Lake Tanganyika, moreover I have captured its allies *I. squamulosa* and *I. capensis* (this last in Mozambique) under even more arid conditions on open plains almost devoid of trees, but with scattered patches of scrub. Parker (1936a, p. 118) places *bivittata* with the rain-forest fauna of Angola; while this may be the case on the other side of the continent it is a point worth reconsidering. *Chamaeleon etiennei* is another species which I should imagine is primarily a resident in orchard savanna rather than in the rain forest.

Crocodylus cataphractus also 2.

Crocodylus niloticus also 2, 5.

Testudo p. babcocki also 5.

Testudo tornieri also 5.

Testudo procerae

Kinixys spekii also 5.

Kinixys belliana

Pelomedusa galeata also 2, 5.

Pelusios sinuatus also 2, 5.

Pelusios n. nigricans also 2, 5.

Trionyx triunguis also 2, 9.

Cycloderma frenatum also 2.

Hemidactylus tanganicus

Hemidactylus brookii also 5.

Hemidactylus mabouia also 5.

Hemidactylus w. werneri also 5.

Hemidactylus w. alluaudi

Hemidactylus l. squamulatus also 5.

Lygodactylus strigatus

Lygodactylus capensis

Lygodactylus scheffleri

Lygodactylus grotei also 5.

Lygodactylus p. gutturalis

Lygodactylus p. ukerewensis

Lygodactylus p. mombasicus also 5.

Lygodactylus p. picturatus also 5.

Pachydactylus b. turneri

Pachydactylus boulengeri

Agama r. septentrionalis

Agama h. armata

Agama m. montana

Agama a. agama

Agama a. lionotus also 5.

Agama a. usambarae

Agama a. elgonis

Agama a. dodomae

Agama a. ufipae

Agama p. mwanzae

Agama p. caudospinosa

Agama atricollis also 5.

Zonurus tropidosternum also 5.

Zonurus ukingensis

Varanus albigularis also 5.

Varanus ocellatus also 3, 5.

Varanus niloticus also 2, 3, 5.

Amphisbaena phylofiniens

Amphisbaena mpwapwaensis

Geocalamus modestus

Geocalamus acutus

Nucras b. boulengeri

Nucras b. kilosae

Eremias s. spekii also 5.

Eremias s. sextaeniata also 5.

Latastia johnstonii

Latastia l. revoli

Ichnotropis tanganicana

Ichnotropis bivittata

Ichnotropis squamulosa

Gerrhosaurus m. major also 5.

Gerrhosaurus m. zechi

Gerrhosaurus f. flavigularis also 5.

Gerrhosaurus f. nigrolineatus

Mabuya maculilabris also 5, 9.

Mabuya planifrons also 5.

- Mabuya brevicollis* also 5.
Mabuya megalura also 5, 7.
Mabuya q. obsti
Mabuya bayonii
Mabuya v. varia also 5, 7.
Mabuya striata also 5.
Riopa sundevallii also 5.
Riopa m. modestum also 5.
Riopa anchietae also 7.
Lygosoma gromieri (! Tsavo)
Ablepharus wahlbergii also 5.
Ablepharus megalurus
Melanosepa ater also 2, 5, 7, 9.
Acontias percivali
Chamaeleon anchietae
Chamaeleon senegalensis
Chamaeleon g. gracilis
Chamaeleon d. roperi also 5.
Chamaeleon d. quilensis also 5.
Chamaeleon d. dilepis also 5.
Chamaeleon b. bitaeniatus also 8.
Chamaeleon melleri
Brookesia platyceps also 8.
Brookesia temporalis also 8.
Brookesia brevicaudata also 5, 8.
Brookesia k. kerstenii also 5, 8.

Leptotyphlops conjuncta also 5.
Leptotyphlops emini also 5.
Typhlops s. mucruso also 5.
Typhlops s. excentricus
Python sebae also 2, 5, 9.
Eryx c. loveridgei
Natrix o. olivacea also 2, 5.
Glypholycus bicolor also 2.
Boaedon lineatus also 5, 9.
Lycophidion c. capense also 9.
Mehelya c. chanleri also 5.
Mehelya nyassae also 5.
Chlorophis hoplogaster also 2, 9.
Chlorophis neglectus also 2, 5, 9.
Chlorophis irregularis also 2, 9.
Philothamnus s. semivariegatus also 5,
 9.
Philothamnus s. dorsalis
- Coronella coronata* also 5.
Coronella s. semiornata also 5.
Coronella s. fuscurosea
Grayia smythii also 2, 9.
Grayia tholloni also 2, 9.
Prosymna a. stuhlmanni also 5.
Scaphiophis albopunctatus also 5.
Dasypeltis scaber also 5, 9.
Tarbophis s. semiannulatus also 5.
Crotaphopeltis h. hotamboeia also 5.
Crotaphopeltis degeni
Chamaetortus a. aulicus also 5.
Amplorhinus nototaenia
Rhamphiophis acutus
Rhamphiophis rostratus also 5.
Rhamphiophis rubropunctatus also 5.
Dromophis lineatus
Psammophis punctulatus also 5.
Psammophis sibilans also 5.
Psammophis subtaeniatus also 5.
Psammophis biseriatus also 5.
Psammophis angolensis also 5.
Thelotornis kirtlandii also 5, 9.
Dispholidus typus also 5, 9.
Calamelaps unicolor also 5, 9.
Rhinocalamus dimidiatus
Micrelaps bicolor also 5.
Aparallactus jacksoni
Aparallactus lunulatus
Aparallactus guentheri
Aparallactus capensis
Aparallactus concolor also 5.
Chilorhinophis gerardi
Boulengerina a. stormsi also 2.
Naja h. haje
Naja melanoleuca also 9.
Naja n. nigricollis also 5.
Dendraspis angusticeps also 5.
Causus rhombeatus
Causus resimus also 5, 9.
Causus defilippi also 5, 9.
Vipera superciliaris also 5.
Bitis worthingtoni
Bitis arietans also 5.
Atractaspis bibronii also 5.

- Atractaspis katangae*
Atractaspis microlepidota also 5.

Scolecormorphus kirkii also 9.

Xenopus l. victorianus also 2.
Xenopus l. borealis also 2, 7.
Xenopus muelleri also 2, 5.
Bufo carens
Bufo r. regularis also 6, 7, 9.
Bufo vittatus
Bufo parkeri
Bufo urunguensis
Bufo ushoranus
Bufo t. taitanus
Bufo micranotis also ?7.
Chiromantis p. petersii also 5.
Chiromantis xerampelina also 5.
Leptopelis bocagii
Hylambates verrucosus ?
Kassina senegalensis also 5.
Megalixalus fornasini also 2, 5.
Megalixalus dorsalis also 2.
Megalixalus fulvovittatus also 2.
Megalixalus brachynemesis also 2, 5.
Hyperolius spp.
Rana g. bravana also 2, 5.

Rana f. angolensis also 2, 7.
Rana floweri also 6.
Rana o. oxyrhynchus also 2, 5, 7.
Rana m. mascareniensis also 2, 5, 7.
Rana ansorgii
Rana stenocephala also 2.
Rana occipitalis also 2.
Rana edulis also 5.
Rana d. delalandii also 5.
Rana macrotympanum
Rana ornata
Rana pulchra
Arthroleptis bottegi (if it occurs)
Arthroleptis s. stenodactylus also 5.
Arthroleptis whytii
Arthroleptis moorii
Arthroleptis minutus also 5, 7.
Phrynobatrachus acridoides also 2, 5,
7.
Phrynobatrachus natalensis also 2, 5,
7.
Hemisus m. marmoratum also 5.
Hemisus m. guineensis
Breviceps mossambicus also 5.
Spelaeophryne methneri also 5.
Phrynomerus bifasciatus also 5.

Zone 7. Grassy Uplands and Alpine Meadows

At high altitudes in East Africa it is usual to encounter extremes of temperature which, on the plateaus particularly, are correlated with the presence of a usually treeless grassland. Nairobi (5,452 feet) is situated where the savanna steppe and this type of upland meet; in consequence it possesses a herpetofauna which is preponderantly that of the savanna with a small admixture of characteristically grassland species.

On reaching the alpine zone it is only natural to find the poikilothermous fauna much reduced. Such hardy species are marked by an asterisk (*) on the following list. Among them are two races of chameleon, occurring on Mounts Ruwenzori and Elgon, which are somewhat doubtfully placed here as they are most abundant along the upper limits of the forest. To restrict them to zone 8, however, would be

artificially curtailing their actual habitat for they do occur on the small shrubs and tree heaths scattered through the alpine meadows. It is possible that recognizable forms occur at a similar altitude on Mounts Kenya and Kilimanjaro; whether the names which have been proposed for *bitaeniatus* from these mountains are really applicable to recognizable montane forms has, as yet, to be demonstrated.

The accompanying list might be augmented by the inclusion of a number of widespread species of snakes such as *Python sebae*, *N. o. olivacea*, *P. sibilans*, *N. nigricollis*, etc., which in some localities may penetrate this zone from that of the savanna. To include them, however, would be to mask the true grassland fauna.

<i>Chamaesaura tenuior</i> possibly 6.	<i>Bufo r. kisolensis</i>
<i>Chamaesaura miopropus</i>	<i>Bufo l. lönnbergi</i>
* <i>Algiroides allenii</i>	<i>Bufo l. nairobiensis</i>
<i>Mabuya megalura</i> also 5, 6.	<i>Bufo mocquardi</i>
* <i>Mabuya v. varia</i> also 5, 6.	<i>Bufo t. uzungwensis</i>
<i>Mabuya v. brauni</i> (if distinct)	<i>Hyperolius spp.</i>
* <i>Mabuya irregularis</i>	<i>Rana wittei</i>
<i>Riopa anchietae</i> also 6.	* <i>Rana f. angolensis</i> also 2, 6.
<i>Melanoseps ater</i> also 2, 5, 6, 9.	<i>Rana o. oxyrhynchus</i> also 2, 5, 6.
* <i>Chamaeleon b. rudis</i>	<i>Rana m. mascareniensis</i> also 2, 5, 6.
* <i>Chamaeleon b. altaeeligonis</i>	<i>Rana m. uzungwensis</i>
<i>Lycophidion c. uzungwensis</i>	<i>Rana f. merumontana</i>
<i>Pseudaspis cana</i>	<i>Arthroleptis ukingensis</i>
<i>Duberria l. shiranum</i>	<i>Arthroleptis rungwensis</i>
<i>Trimerorhinus t. tritaeniatus</i>	<i>Arthroleptis minutus</i> also 5, 6.
<i>Trimerorhinus t. multisquamis</i>	<i>Arthroleptis parvulus</i>
<i>Vipera hindii</i>	<i>Phrynobatrachus kinangopensis</i>
<i>Xenopus l. petersii</i> also 2, 6.	<i>Phrynobatrachus acridoides</i> also 2, 5, 6.
<i>Xenopus l. bunyoniensis</i> also 2.	<i>Phrynobatrachus natalensis</i> also 2, 5, 6.
<i>Xenopus l. borealis</i> also 2, 6.	<i>Phrynobatrachus keniensis</i>
<i>Bufo r. regularis</i> also 5, 6, 9.	<i>Cacosternum b. boettgeri</i>

Zone 8. Forest-edge

This otherwise unnecessary zone had to be erected for the reception of the many species of chameleon which, for the most part, are only found in association with rain forest though not necessarily resident in it. While it is certain that some of them live on the forest canopy, to what extent they do so is yet to be learned. Some of the species are

numerous in recently deforested areas, the majority are to be found on bushes and low trees adjacent to the forest in the highlands and mountains.

Naturally as the meeting place of the forest fauna and that of the adjacent zone, the heading of Forest-edge might be vastly extended to include all the forms of life occurring within and without the forest. Such action would defeat our purpose in zoning the herpetofauna, and so the list is confined to those species of chameleons for which it was created.

Chamaeleon b. bitaeniatus also 6.

Chamaeleon b. höhneli

Chamaeleon zenorhinus

Chamaeleon carpenteri

Chamaeleon tenuis

Chamaeleon spinosus

Chamaeleon goetzei

Chamaeleon laterispinis

Chamaeleon incornutus

Chamaeleon tempeli

Chamaeleon f. fischeri

Chamaeleon f. multituberculatus

Chamaeleon f. tavetensis

Chamaeleon f. excubitor

Chamaeleon fülleborni

Chamaeleon werneri

Chamaeleon j. johnstoni

Chamaeleon jacksoni

Chamaeleon deremensis

Brookesia platyceps also 6.

Brookesia temporalis also 6.

Brookesia brevicaudata also 5, 6.

Brookesia k. kerstenii also 5, 6.

Zone 9. Rain Forest, usually montane

With the exception of the herpetofauna of the marine and northern desert zones, that of the rain forest, by reason of its specialization, stands out with greater distinction from the faunae of adjacent areas than is the case with any other group.

Nevertheless, even here there are a score of species occasionally occurring within the forest limits which are not typical of its facies. Such species have been placed in a separate category following immediately after that of the true sylvicoline fauna. Being composed of widely distributed forms, they are not considered in discussions of the true forest herpetofauna.

I imagine that *Boiga blandingii* should really be relegated to this group. I have had no personal acquaintance with this species in the field, but I am told by a West African resident that this reptile is commonly found in palm trees; that being the case I would suggest it belongs, together with *Dispholidus typus* and *Thelotornis kirtlandii*, in the subsidiary group of arboreal snakes which are as abundant in arid orchard savanna as in primary forest. Whether, as I imagine was

the case, these species originated in the primeval forest and later adapted themselves to life in the savanna, will ever remain a matter of opinion.

Some of the species of *Atheris* are also doubtfully sylvicoline, ultimately these tree vipers may have to be considered as forest-edge fauna. *A. nitschei* even appears to be adapted to bush in montane marshland as well as in the bamboo belt. Whether the skink, *Riopa fernandi*, is a true forest form is not clear. I have only taken it near the lake shore at Entebbe, though on former forest land. Entebbe is designated a rain-forest outlier by Engler (1908, *Vegetation der Erde*, 9, 1, part 1, pl. ii).

This raises another point which demands mention. Even a decade or two after deforestation has taken place, one may expect to find sylvicoline species here and there surviving under savanna conditions, especially where, as at Entebbe, scattered clumps of trees have been left standing. A case in point is that of the caecilian, *Scolecophorus kirkii*, which I have marked with a query. Though its relatives are all residents of montane forest, the only individual of *kirkii* which I have taken was dug up in savanna woodland on a high plateau where formerly forest existed. Whether the species is doomed to disappear, or whether it will be able to adapt itself to the changed conditions, will have to remain an open question for the present. Meantime it is accredited to both zones. An interesting account of the changes which are taking place in the composition of the amphibian fauna of deforested areas in the Cameroons, has been published recently by Sanderson (1936, p. 179).

I (1933, pp. 27-43) have already worked out the percentage of sylvicoline genera common to the Cameroon Mountains on the west and the Usambaras on the east. In the same paper tables were given of the vertebrate fauna of the forests of the Usambaras and the series of ranges lying to the southwest of them.

Two corrections to the lists are now necessary. *Lygodactylus conradti* of the Usambara and Uluguru Mountains, synonymized with *fischeri* of Sierra Leone by Müller must now be recognized as distinct. *Leptopelis rufus* recorded by Tornier from the Usambaras and by myself from the Uluguru range was based on adults of the frog described as *parkeri* by Barbour & Loveridge (Uluguru) and subsequently rediscussed as *martiennsseni* by Ahl (Usambara region). This further reduces the number of species with a transcontinental distribution in the forests to five reptiles and a single amphibian.

If we take the forest 'islands' in East Africa from the southeast to

the northwest, *i. e.* Usambara, Mbololo, Kilimanjaro, Meru, Kenya, through Kaimosi in Kakamega, to Elgon, we find only five species which are known from all, or almost all, viz.:

Lacerta jacksoni (yet to be recorded from Mt. Kenya).

Elapsoidea güntherii (not recorded from Mbololo, Meru and Kenya).

Naja melanoleuca (absent from Usambara, Mbololo, Meru and Kenya).

Rana fuscigula chapini (present on all seven of the areas).

Rana oxyrhynchus gribinguiensis (not recorded from Kilimanjaro, Mbololo, Meru and Kenya, unless confused with the typical race).

It is only right to add that Mbololo has undergone such deforestation that many of the species formerly inhabiting it have probably disappeared. Meru and Kenya are very little known from a herpetological point of view. Further we find two species which have developed eastern or western races, these are:

Cnemaspis a. africanus (on Usambara and Mbololo).

Cnemaspis a. elgonensis (at Kaimosi and on Elgon; the Kenya record probably refers to this race).

Typhlops p. gierrai (on Usambara).

Typhlops p. punctatus (on Kilimanjaro, Kenya, Elgon, etc.)

Finally there are two green snakes, obviously related, so long separated as to have become distinct species.

Chlorophis macrops (known only from the Usambara).

Chlorophis carinatus (Kaimosi, Elgon and west to the Cameroons).

The most interesting types of amphibian life in the Usambara and Uluguru Mountains are found among the caecilians and brevicipitids, for they furnish the greatest number of endemic forms and genera. Since the discovery of *Parhoplophryne* and *Hoplophryne* in 1926, Parker has monographed the whole family to which they belong. He refers the three species involved to the subfamily *Melanobatrachinae*, typified by *Melanobatrachus indicus* of India. Of all the members of the family, these three genera of brevicipitids are alone in possessing an incomplete auditory apparatus.

Parker (1934, p. 11), on the basis of their present distribution and area of greatest differentiation, postulates southeastern Asia as the centre of dispersal of the Brevicipitidae (*Microhylidae*). From thence they spread west and southwards into Africa. He logically assumes that the desiccation of northeast Africa in relatively recent geological times accounts for their extermination north of Kenya Colony.

Of the four genera comprising the other subfamily (*Brevicipitinae*), three (*Probreviceps*, *Callulina* and *Spelaeophryne*) are endemic in Tanganyika Territory, while the fourth (*Breviceps*) extends from

Tanganyika southwards to the Cape. In view of the known facts of their present-day distribution, and confirmed by our futile search for brevicipitids in the montane forests to the north and west of the Usambaras, it appears improbable that they ever spread in that direction. The sylvicoline forms, like the caecilian genus *Scolecophorus*, after undergoing their greatest differentiation in the Usambara-Uluguru region, expanded towards the southwestern highlands of Tanganyika where continued humid conditions favour their survival.

Kinixys erosa ?

Cnemaspis a. africanus
Cnemaspis a. elgonensis
Cnemaspis quattuorseriatus
Lygodactylus conradi
Lygodactylus angularis
Lacerta vauereselli
Lacerta jacksoni
Algiroides africanus ?
Algiroides boulengeri ?
Bedriagaia moreaui
Holaspis guentheri
Riopa fernandi ?
Lygosoma kilimensis
Lygosoma aloysiisabandiae
Lygosoma g. graueri
Lygosoma m. meleagris
Lygosoma kutuensis
Scelotes eggeli
Scelotes uluguruensis
Scelotes tetradactyla and 5.
Melanoseps ater also 2, 5, 6, 7.
Feylinia c. elegans ?

Typhlops uluguruensis
Typhlops gracilis
Typhlops graueri
Typhlops p. punctatus
Typhlops p. gierrai
Typhlops kaimosae
Natrix o. uluguruensis
Bothrophthalmus l. lineatus
Boaedon olivaceus
Lycophidion meleagris

Hormonotus modestus
Mehelya capensis
Mehelya poensis
Chlorophis macrops
Chlorophis carinatus
Gastropyxis smaragdina
Hapsidophrys lineata
Thrasops j. jacksonii
Thrasops j. schmidti
Rhamnophis a. elgonensis
Prosymna ornatissima
Geodipsas procterae
Geodipsas vauerocegae
Boiga blandingii ?
Crotaphopeltis h. tornieri
Crotaphopeltis werneri
Miodon gabonensis
Miodon christyi
Aparallactus werneri
Aparallactus uluguruensis also 5.
Aparallactus christyi
Elapsoidea guntherii (*nigra* type)
Naja melanoleuca also 6.
Dendraspis j. kaimosae
Causus lichtensteinii
Bitis gabonica
Bitis nasicornis
Atheris squamigera
Atheris nitschei ?
Atheris ceratophorus ?
Atheris barbouri ?
Atractaspis irregularis
Atractaspis bipostocularis
Atractaspis conradi
Atractaspis aterrima

<i>Boulengerula boulengeri</i>	<i>Arthroleptides dutoiti</i>
<i>Boulengerula taitanus</i>	<i>Rana albolabris</i>
<i>Boulengerula uluguruensis</i>	<i>Rana f. chapini</i>
<i>Scolecormorphus vittatus</i>	<i>Rana o. gribinguiensis</i>
<i>Scolecormorphus uluguruensis</i>	<i>Rana m. venusta</i>
<i>Scolecormorphys attenuatus</i>	<i>Arthroleptis poecilnotus ?</i>
<i>Scolecormorphys kirkii ?</i> also 7.	<i>Arthroleptis s. lönnbergi</i>
	<i>Arthroleptis adolffriederici</i>
<i>Bufo brauni</i>	<i>Arthroleptis reicheti</i>
<i>Bufo c. camerunensis</i>	<i>Arthroleptis schubotzi</i>
<i>Nectophrynoides tornieri</i>	<i>Arthroleptis rouxi</i>
<i>Nectophrynoides vivipara</i>	<i>Arthroleptis xenodactylus</i>
<i>Leptopelis johnstoni</i>	<i>Phrynobatrachus krefflii</i>
<i>Leptopelis vermiculatus</i>	<i>Phrynobatrachus dendrobates</i>
<i>Leptopelis aubryi</i>	<i>Phrynobatrachus graueri</i>
<i>Leptopelis notatus</i>	<i>Callulina kreffti</i>
<i>Leptopelis parkeri</i>	<i>Probreviceps m. rungwensis</i>
<i>Leptopelis uluguruensis</i>	<i>Probreviceps m. macrodactylus</i>
<i>Leptopelis karissembensis</i>	<i>Probreviceps m. loveridgei</i>
<i>Hylambates verrucosus</i>	<i>Probreviceps uluguruensis</i>
<i>Megalicalus uluguruensis</i>	<i>Parhoplophryne usambaricus</i>
<i>Hyperolius</i> spp.	<i>Hoplophryne uluguruensis</i>
<i>Arthroleptides martiensseni</i>	<i>Hoplophryne rogersi</i>

Additional species which sometimes occur in rain forest, though not typical of its fauna having invaded it from the adjacent savanna. Half of them occur in Zone 2, their distribution being conditioned by the presence of water.

<i>Pelusios n. nigricans</i> also 2, 5, 6.	<i>Philothamnus s. semivariatus</i> 5, 6.
<i>Pelusios derbianus</i> (doubtful) also 2.	<i>Grayia smythii</i> also 2, 6.
<i>Trionyx triunguis</i> also 2, 6.	<i>Grayia tholloni</i> also 2, 6.
	<i>Dasypeltis scaber</i> also 5, 6.
<i>Mabuya maculilabris</i> also 5, 6.	<i>Thelotornis kirtlandii</i> also 5, 6.
	<i>Dispholodus typis</i> also 5, 6.
<i>Python sebae</i> also 2, 5, 6.	<i>Calamelaps unicolor</i> also 5, 6.
<i>Boaedon lineatus</i> also 5, 6.	<i>Causus resimus</i> also 5, 6.
<i>Lycophidion c. capense</i> also 6.	<i>Causus defilippi</i> also 5, 6.
<i>Chlorophis hoplogaster</i> also 2, 6.	
<i>Chlorophis neglectus</i> also 2, 5, 6.	<i>Bufo r. regularis</i> also 5, 6, 7.
<i>Chlorophis irregularis</i> also 2, 6.	

SUMMARY OF CONCLUSIONS

1. Any attempt to explain the present-day distribution of the East African sylvicoline herpetofauna, is rendered highly speculative on account of the absence of palaeontological data in the shape of tertiary fossil representatives of the group.
2. While probably never entirely continuous during any one period, more or less uninterrupted forest communication between the Usambara Mountains of East Africa and the Cameroon Mountains on the West Coast is postulated on account of the presence in both of such a highly specialized arboreal form as *Holaspis guentheri*.
3. Further evidence for such connection is to be found in the fact that the majority of the reptilian, and many of the amphibian genera are common to both ranges.
4. That the period of such connection was very remote is becoming increasingly clear from the accumulating data which demonstrates that very few *species* of the sylvicoline herpetofauna are common to both ranges.
5. In East Africa only seven sylvicoline species show anything like an uninterrupted distribution of the forested mountains lying between the Usambaras and Mount Elgon.
6. When one considers the endemic, sylvicoline genera of East African amphibia, those of the caecilians and brevicipitids, as well as *Nectophrynooides* among the bufonids, point to a continuity of the essentially humid conditions provided by forests in the direction of the southwestern highlands of Tanganyika, and not across the continent in a northwesterly direction.
7. Fresh data, pertinent to the enquiry, may be summed up as follows: The hitherto monotypic lacertid genus *Bedriagaia*, known only from the Ituri Forest of the Belgian Congo, is found to have a second species in the Usambara Mountains. The heretofore monotypic ranid genus *Arthroleptides*, supposedly confined to the Uluguru and Usambara Mountains, provides a second species on Mount Elgon. Additional records fill in the gaps of our knowledge of the distribution of the montane forms of *Cnemaspis africanus*, *Rana fuscigula* and *Rana oxyrhynchus*.
8. For the first time an attempt is made to assign every species (with the single exception of *Hyperolius* spp.) of amphibian and reptile

occurring in the British territories in East Africa, to its correct ecological habitat. Considerable ecological data resulting from the expedition has appeared already in the preceding reports of this series.

ACKNOWLEDGMENTS

I take this opportunity of expressing my indebtedness to the John Simon Guggenheim Memorial Foundation, without whose financial help these investigations could not have been made. To Mr. Childs Frick of New York, whose generous contribution defrayed the special expenses incurred in making the collection of mammals, including the pay of the two native skimmers employed.

Mr. A. Walter of the Meteorological Service, through Dr. V. G. L. van Someren; and also Mr. H. B. Stoneham of Kitale, supplied me with valuable statistics regarding rainfall, which proved of great service in planning the trip. Later Mr. J. H. Robins of the Department of Public Works, Mombasa, whom I met at a ferry, went to considerable trouble to route me to Lamu, providing me with a sketch map and directions as to what to do should the lorry become bogged in the uninhabited stretches of the Tana delta during the 'big rains.'

To the Game Wardens of Uganda and Kenya for arranging special collecting licenses to cover the few species of game animals desired. To Mr. C. L. Hunter, Provincial Commissioner of the Eastern Province, Uganda, for a license to enter Karamoja District. I am also most grateful to Messrs D. Keith Burner and J. R. McD. Elliot, in charge of the Karamoja and Bugishu Districts respectively, for kindnesses received during my stay in their areas.

For hospitality and assistance I am indebted to the staff of the Friends Africa Mission at Kaimosi, Messrs A. B. Smith of Kibwezi, R. D. Milne of Witu, P. A. Petley of Belazoni, and many others.

ITINERARY

The following detailed information concerning the camps at which collecting was carried on, has been arranged in the order of the itinerary. Where, however, a locality was visited both upon the outward and return journey as was the case on the coast of Kenya north of Mombasa, the place is dealt with chronologically only on the outward trip. It might be noted that in the reports dealing with the material collected, the specimens are listed chronologically in the order of the itinerary.

After the name of the locality, the approximate position and altitude of the camp is given, followed by more precise data, where necessary, as to the location of the camp and the period during which collecting was carried out in the vicinity. This is intended to serve as a check to the dates on the labels accompanying the specimens in case the figures become defaced, or illegible, with the passage of time.

The climatic conditions are of such outstanding importance in the collecting of lower vertebrates that the meteorological aspect of each camp during our sojourn, is given in detail.

Where the place was already a type locality for vertebrates of which I was in search, the names of such are often listed as a guide to future collectors who may desire to secure topotypical material. I am inclined to think that the value of such material is insufficiently appreciated. Where a species has been described from some rapidly-developing centre such as Kampala or Mombasa, it may be already too late to obtain topotypes. This is particularly applicable to amphibia in districts where energetic anti-anopheline measures render pools uninhabitable for tadpoles.

In the systematic papers dealing with the vertebrates, the local names applied by the various tribes to the creatures taken in their vicinity, have been inserted. To be confident of absolute accuracy in regard to such names, one should really live for many years among that particular tribe. This being impossible, I have endeavoured to take reasonable precautions to secure accuracy, but it is to be expected that some errors will have crept in. Every native is not a zoölogist, but every native in his desire to be obliging is apt to call an animal by the name he thinks most applicable, should he be unfamiliar with the correct one. To avoid such errors, specimens were often submitted to groups of natives who argued or discussed alternative names before submitting the final opinion to me.

UGANDA

Karita River, Eastern Province. 1°33' N., 34°49' E. Alt. 3,000 feet.

A waterhole in the river bed west and slightly north of Kacheliba. The speedometer gave it as 66 miles by road and track from Kitale, Kenya Colony.

Camped, while awaiting the arrival of porters, from late on November 8 till we departed shortly after daybreak on November 10, 1933.

No rain. We had to dig deep for water in the broad stretch of sand which represented the Karita River, on whose bank our tents were pitched. A few hundred yards below the crossing there were some large pools of excessively foul water which were stagnating among the boulders in a rocky gorge. A high wind, while tempering the heat to some extent, rendered skinning exceedingly difficult. Still worse were the plague of domestic flies which infested the place, and rendered eating impossible unless a hand was waved continually above each mouthful.

Wild life, other than game, was abundant and wholly typical of this thorn-bush steppe. A pair of squirrels (*Heliosciurus m. elegans*) attracted attention by dropping discarded fragments of their meal upon the tent. With their exception no mammals were taken during the day. The morning was spent in shooting birds, the afternoon in collecting lizards. I was somewhat surprised to find that the lizards which darted about the paths and open places in this arid region were chiefly *Eremias s. sextaeniata* which, in this latitude, evidently inhabits the whole belt of dry country to the east coast.

The local Suk were entirely disinterested in us. Like their neighbours and sworn foes, the Karamojong, they are wholly engrossed with the welfare of their large herds of cattle. In the evening they brought the animals down to be watered.

As darkness fell the sixty odd Karamojong porters stalked into camp, weary from their long journey, but excessively garrulous notwithstanding. Their lanky build and slender legs proclaim the admixture of Nilotic blood in these primitive Half-Hamites. Their habit of standing to rest upon one leg reminded one of this trait among the Dinka. Less than half-a-dozen of these sixty-five porters wore any clothing whatever, the rest were entirely nude. Most of the 12,000 square miles of Karamoja is so hot by day as to render clothing superfluous.

Loborokojo, Eastern Province. circa $1^{\circ}27' N.$, $34^{\circ}46' E.$ Alt. 3,500 feet.

A midday halt near Greeki River about 10 miles southwest of Karita River. Here on November 10, a few geckos were found on tree trunks where, on the shady side, they found some shelter from the withering heat.

Aturai, Eastern Province. circa $1^{\circ}36' N.$, $34^{\circ}39' E.$ Alt. 3,500 feet.

Camped for the night of November 10 on the open plain.

The spelling is phonetically transcribed from the pronunciation of our Karamojong headman, another gave it as Atirwai. It is unknown to the Survey Department of Uganda, but is apparently near the place called Kabkwaryi on their map A 702. The whole desolate region is uninhabited at this season of the year.

The Karamojong, however, are a nomadic, pastoral people with ways akin to those of the Masai. Totally unused to portorage, a forty-pound load was as much as most of them could carry. Obsessed by the fear of thirst, resulting from their upbringing in this arid region, they daily exaggerated the distances between waterholes. At Aturai they unanimously asserted that it would be an eight-hour march to the next water. We set out with twenty gallons of water which I sent ahead for twelve miles, *i. e.* a four-hour march, presumably marking the halfway point of our journey. On arrival at this halt, which they called Kananyait ($1^{\circ}43' N.$, $34^{\circ}35' E.$ on Survey map A 702), they fell upon the water like wild things, spilling it wastefully as they fought for the possession of the drums. Three miles further on we reached a waterhole, Kanapo, where we camped! They had come this way only two days before yet could not differentiate between five and eight hours marching time.

Kanapo, Eastern Province. circa $1^{\circ}46' N.$, $34^{\circ}34' E.$ Alt. 3,500 feet.

A stagnant pool covered with thick scum and fouled by game. It was evidently a survival from a stream in whose bed it lay. For further remarks see preceding paragraph.

Camped for the night of November 11 on the path, as the eight-foot growth of rank grass hemmed us in.

Mount Debasien, Eastern Province. 1°50' N., 34°40' E. Alt. 5,000 feet.

Rising from the arid plains of southern Karamoja to a height of 10,050 feet, Mount Debasien (see Peters & Loveridge, 1936, pl. 2, fig. 2) or Kadam, as it is known locally, retains a small patch of virgin forest just below its western summit.

Camp, however, was made in gallery forest fringing the Amaler River at 5,000 feet.

Camped from November 12 to December 3, 1933.

The river (pl. 2, fig. 1) was but a shallow stream, yet it was the only water flowing on the western slopes so far as we could ascertain. Behind the camp was a dry watercourse whose broad bed was covered with pebbles and boulders (pl. 2, fig. 2), typical of some four or five similar watercourses which we explored. On November 15-16, fifteen hours of rain fell, but was so rapidly absorbed by the parched soil that there was little to show for it. A few pools formed in the river bed higher up the mountain, the larger ones were quickly fouled by thirsty buffalo, the smaller became the haunts of frogs (*Arthroleptis minutus* and *Phrynobatrachus natalensis*). Towards the end of our stay a few more heavy showers occurred, but exercised a negligible effect on the arid conditions which prevailed.

The rank growth of eight-foot grass which clothed the plain, extended up the mountain past our camp to about 8,000 feet. It was interspersed with acacia whose spreading tops, when viewed from afar, give a false impression of forest. The virgin forest, extending from about 8,000 feet to the base of the rocky mass which crowns the summit of the mountains is discussed elsewhere in this report.

Notwithstanding the fact that over 300 vertebrates, representing 80 species, were preserved, I do not think that I should be far wrong in saying that Debasien proved to be the most disappointing locality which I have ever visited. Not only did the rank grass, thorn scrub, and other natural obstacles make it difficult to get about, but they rendered collecting a more arduous undertaking. The two skimmers, who had been sent to me at Kitale, proved to be unskilled and untrustworthy, necessitating much supervision.

Local natives brought in nothing. No Karamojong visited our lonely camp during the three weeks that we spent on the mountain.

Greki River, Eastern Province. 1°34' N., 34°36' E. Alt. 3,000 feet.

Camp was made on the south bank, *i. e.* Bugishu district, near a recognized ford and fishing rendezvous which I later learned was known as Nabugut. It is indicated on the labels whether specimens were taken on the south, or north bank, *i. e.* Karamoja district.

Camped, while awaiting the arrival of porters, from noon on December 4 until 3.40 A.M. on December 7, 1933.

No rain. The withering heat was more oppressive than at any time during the course of the whole expedition. When the big rains are on, this region becomes a morass as was evidenced by the numerous footprints of elephant, giraffe, and other game. At the time of our visit, however, the soil was baked and fissured and the coarse dry grass waist-high. Attempts at burning the latter had been made without much success, so that one returned from every walk more or less blackened and always covered with ticks. Traps were set at the edge of burnt patches and resulted in the capture of a pair of rats which Dr. Allen has described as *Saccostomus cricetulus*. Their presence here constitutes a northwestward extension of the range of the genus. Other species such as *Mastomys c. tinctus* and *Lemniscomys s. massaicus* were also trapped, but though the traps were visited twice daily, we lost a number of skins whose fur slipped on account of the intense heat. Ants were also a source of trouble despite our ringing the traps with ash as a precautionary measure. Apart from two small parties of hartebeest and zebra, no game was seen during our short stay. A leopard visited the camp one night and a nearby grass-grown *donga* reeked with the odour of lions.

These plains being type locality for *Francolinus c. gedgii*, a series were collected as were also the smaller *F. s. granti* and larger guinea-fowl, *Numida m. major*, for game-birds were plentiful. Somewhat of a surprise was the finding of a scarce titmouse (*Anthoscopus musculus*) in such a region. Only common and widespread savanna forms of reptile life were encountered at this camp.

No natives were seen until the Sabei porters arrived from Nyenye to conduct us thither. We did the march in 4 hours and 5 minutes without a halt.

Nyenye, Eastern Province. 1°29' N., 34°31' E. Alt. 3,600 feet.

Nyenye is the spelling on the Uganda Survey map M 54, but on my labels it is written Ngange or Nyange after hearing it repeatedly spoken by several local natives. I am inclined to think that my spelling is the more accurate rendering for it has some phonetic connection with Mount Nyang (of the Survey map A 702) which lies just north of the Greeki River and due north of Nyenye. There is also a Nyange in the Uluguru Mountains of Tanganyika Territory, where I collected in October, 1926.

Nyenye lies at the northern foot of Mount Elgon. Our tents were pitched on the site of the government rest camp, a lovely location among tall trees with a river flowing close by. Forest francolin called in the underbrush but I was unable to get a shot at them; in fact a fruit pigeon (*Treron c. salvadorii*) was the only bird collected. A few reptiles and amphibians were taken in the late afternoon.

Camped from 8 A.M. on December 8, until 4.30 A.M. on December 9, 1933.

Sabei, Eastern Province. 1°24' N., 34°27' E. Alt. 6,230 feet.

Sabei is the spelling on Survey map M 54, as well as that employed by Johnston (1902, 2, p. 583) and on my labels. In their recent and authoritative work, Thomas and Scott (1935, p. 443), refer to it as Sebei. As type locality of *Melittophagus l. oreobates*, it was rendered as Savé by Jackson, who with Gedge, in 1890, were the first white men to cross Mount Elgon, first seen by a European (Thomson) in December, 1883.

Stayed the weekend at the Government Rest Camp from the 9th till our departure at 5.30 A.M. on December 11, 1933.

No rain. After the grueling ascent from the hot plains, it was delightful to reach this well-kept camp on the main trail which encircles the mountain at this elevation. *Safari* duties, such as paying off porters and making the necessary arrangements for the future, occupied much of the day, but I was able to get out in the late afternoon. There was evidence that the former forest had been long since destroyed to make way for the intensive cultivation of this thickly settled area. The presence of *Rana f. chapini* was a token of previous forestation, but the only reptiles taken (*Lycophidion c. capense* and *Mabuya striata*) suggest immigration from the plains for these creatures, as is known to be the case with the Sabei inhabitants who are Half-Hamites of Nandi affinities.

Sipi, Eastern Province. 1°20' N., 3°24' E. Alt. 6,500 feet.

While Sipi rest camp is situated opposite the magnificent Tracy Falls at 5,979 feet, we marched for an hour further up the mountain and made camp beside the Sipi River in a clearing near the lower limits of the forest. Much of our material, however, came from the deforested and settled area lying between our camp and Sipi.

Camped from December 11 to 27, 1933.

Torrents of rain fell during the late afternoon on the day of our arrival. It rained almost daily at about the same time thereafter for a week, though progressively diminishing so we had some wholly fine days towards the end of our stay. These showers marked the end of the small rains. The ground on which we pitched our tents was so sodden with moisture that it welled up as one walked about the tent. The nights were so clammy cold that sound sleep was difficult.

The most remarkable thing about this camp was the almost complete absence of amphibia. All our efforts only resulted in the capture of three species. Of these *Phrynobatrachus graueri* was the only one with any claims to a forest association, the other two (*Bufo r. regularis* and *Rana f. angolensis*) are wide-spread savanna forms. The only possible explanations that occurred to me were the coldness of the water, the swiftness of the streams, and the numerous high falls. There were, however, marshy spots where the shallow and more or less stagnant water warmed up towards midday. Our search in both wild and domestic bananas proved futile.

Of eight species of lizards and chameleons taken, only three were forest forms. Of these one proved to be a new race of *Cnemaspis africanus* of the Usambara Mountains, so that Sipi becomes type locality for *C. a. elgonensis*. Over seventy snakes of eleven species were brought in by natives but only three species were sylvicoline. For one of these, *Chlorophis carinatus*, I claimed the first Uganda record, but while the report was in the press Pitman published on an example which he had taken in the Kigezi district of southwestern Uganda.

The Bagishu, who give the name of Bugishu to the whole district, are born hunters and were exceedingly helpful. They brought in the major portion of the hundred and eighty five mammals, representing thirty-two species, which we made into skins during the fortnight.

Kaburomi, Eastern Province. 1°14' N., 34°31' E. Alt. 10,500 feet.

Kaburomi (not to be confused with Kaburon on the northeast slope at about 8,000 feet) is situated in the alpine meadow zone of Mount Elgon. It is almost certainly the same as Gablaron and Kyeberem, both of which appear on map M 54 of the Uganda Survey Department. Kaburomi or Kaburom is reached after a five hours climb up a native path from our camp above Sipi.

Camped from noon on December 27, 1933, to 10 A.M. on January 1, 1934.

No rain, but the first two days were bleak and windy. Thereafter, though bitterly cold at night, the days were delightful and pleasant from an hour or so after sunup till a few hours before sundown, when it became chilly and bleak. Camp was made on an extensive grassy sward near a hut or *manyatta*, the only large area of level ground to be found in the vicinity. There were several big shady trees near the tents, for scattered trees persist in this zone for some little distance up the mountain.

Strangely enough, the only species of amphibian taken was of the savanna race of *Rana fuscigula*, i.e. *R. f. angolensis*, which appears to have either ascended the eastern slopes and spread downwards to Sipi, or else to have ascended the mountain by following the course of the Sipi, or some adjacent stream, thus driving a distributional wedge between the larger, forest form, *R. f. chapini*, which occurs at Sabei to the north, and Butandiga to the south, of Sipi.

Snakes and tortoises were said to be unknown at this altitude. Of lizards we only took four species during the four days collecting. A single example of the rare *Mabuya irregularis* constituted the first Uganda record, but the other three were abundant. These were *Algiroides alleni*, *Mabuya v. varia*, and a dwarf form of *Chamaeleon b. höhnelii* which I have named *C. b. altaelgonis* with Kaburomi as type locality. It is of interest to note that Roux (1936, p. 173), reporting on the collection made by Jeannel in the alpine zone, independently comments on the characteristics of this dwarf form.

The local Nderobo were very friendly and interested in us, but the population is sparse and scattered and the men preoccupied with the care of their cattle. They did contribute a serval, hyrax, and few species of rodent. I shot a topotype of the duiker (*Sylvicapra g. lobeliarum*), and saw Harvey's duiker, mountain duiker, mountain reedbeek and bushbeek, all rendered wary from much hunting by the Nderobo and their dogs.

Ridge Camp west of Madangi, Elgon. 1°12' N. 34°28' E. Alt. 11,050 ft.

I gave this name to our camp on the uninhabited ridge across the valley west or northwest of Madangi. Whether the name Omudaki, which seems to apply to the lower part of this spur on the Uganda Survey map M 54, is applicable, I cannot say.

Camped from 3 P.M. on January 1 till 10 A.M. on January 3, 1934, while awaiting porters from below Butandiga.

The climate at this season was delightful so long as the sun was shining, but bleak and chilly the minute it was obscured by clouds as frequently happened. A quarter of an inch of ice formed on our washbasins the first morning, rather less the second day. Underfoot the grass was tufty, short and springy. The dominant plants were giant groundse's (*Senecio Johnstoni* and *S. elgonense*) which, in places were so numerous as to provide some shelter from the bitter winds which swept across the ridge.

Mountain duiker, presumably *Cephalophus monticola musculoides*, were moderately abundant but very wild through much hunting. In fact during most of the day which we spent on this ridge, we could hear the tinkling bells on native dogs and the shouts of their owners as these sounds floated up from the valleys far below. Parties of Bagishu could be seen quartering all available cover in search of game. Apart from a hare or two, we saw no other mammals at this altitude, but there were signs in plenty that wild pig come up to root about among the lobelias and groundsel.

Bataleur eagles, augur and mountain buzzards might be seen quartering the mountain sides, but though I went out for a couple of hours in the morning and again in the afternoon the only bird I succeeded in shooting was a European kestrel (*Falco t. tinnunculus*) which had eaten a skink. It seemed advisable to label this bird 'Madangi' as being the nearest recognizable locality.

Mr. Raymond Hook of Nanyuki, who knows Mount Kenya as well as most men, informs me that on that mountain lizards (presumably skinks) reach 15,000 feet, snakes 13,000, chameleons, frogs and toads only 11,000 feet. My own experiences on Mount Elgon revealed skinks (*M. v. varia*) at about 12,000, doubtless they attain the summit; chameleons (*C. b. altaelgonis*) and frogs (*R. f. angolensis*) seen at 11,500 feet. Snakes on the other hand were not seen above 7,000 feet and according to the Nderobo at Kaburomi, they do not occur there.

Madangi, Eastern Province. 1°9' N., 34°30' E. Alt. 11,400 feet.

Madangi (Mudange) is the site of a Government rest camp on the trail from Butandiga to Jackson's Summit, Mount Elgon. We pitched our tent among the disintegrating huts which comprised the rest camp.

Camped from noon on January 3 till nearly noon on January 4, 1934.

No rain, but overclouded till 4 P.M. while cold winds made it still less pleasant. The heather logs for the fire were damp and gave forth an inescapable acrid smoke which was blown in every direction by the bitter winds which whistled through the stockade that formed the walls of the rest house.

At daybreak we ascended to Jackson's Summit (13,650 feet), passing the small lake at 12,500 feet on which there was thin ice. Returning, we reached Madangi at 10 A.M. for breakfast, then continued on down to Butandiga (7,000 feet) which, together with the somewhat breathless ascent of the Summit, made a journey of eighteen miles that day.

As Madangi is situated in the alpine zone there are few trees, though tree heaths (*Erica arborea*), often smothered with lichen (*Usnea*), and lobelias are common in the vicinity of the camp. Apart from the rocky outcrops, most of the mountain side in the vicinity was clothed in tufty grass studded with various species of everlasting flowers (*Helichrysum*).

The only mammals seen were mountain duiker and a single hyrax (*Heterohyrax s. kempi*) at 12,000 feet. The porters caught two rats (*Rhabdomys p. diminutus* and *Otomys t. elgonis*) while gathering fuel. Topotypes of the hillchat (*Pinarochroa sordida rudolphi*) and finch (*Poliospiza striolata ugandae*) were collected besides which the only other bird shot was a migrant harrier (*Circus macrourus*). Mention has been made under the last camp of the only reptiles collected, and frog seen, at this altitude.

Bulambuli, Eastern Province. 1°10' N., 34°25' E. Alt. 8,955 feet.

Bulambuli is the site of another Government rest camp on the trail from Madangi to Butandiga. It is situated in the bamboo (*Arundinaria alpina*) zone. Here we halted for lunch and to give the porters a well-earned rest.

A chameleon (*C. b. höhneli*) was the only reptile collected during our brief halt on January 4, 1934. I searched the bamboos for frogs but with negative results. The bamboos were very slender compared with those in the Uluguru Mountains which harbour such interesting types as *Nectophrynoides tornieri* and *Hoplophryne uluguruensis*.

Butandiga, Eastern Province. 1°12.5' N., 34°22' E. Alt. 7,009 feet.

Butandiga, in Bugishu district, is the site of a well-known rest camp on the trail up western Elgon to Jackson's Summit. The altitude given is that of the rest camp; though our tents were pitched behind and about a hundred feet below, in a little valley where they would be more sheltered.

Camped from January 4 to 17, 1934.

No rain except for a heavy shower one night. The days were relatively hot. The forest has all been destroyed by the industrious Bagishu, who are now cultivating coffee extensively.

The fauna round about proved uninteresting, and, to a great extent, duplicated that of Sipi though eight of the twenty-seven species of mammals taken at Butandiga were not collected at Sipi. Three of the five species of frogs proved to be forms with forest associations, including *Rana f. chapini*, and the huge *R. o. gribinguiensis* now recorded from Uganda for the first time. On the other hand none of the lizards and only one of seven species of snakes (*Thrasops j. jacksoni*) were forest species.

An unfortunate misunderstanding militated against better coöperation of the local natives. When the chief's runner descended from ridge camp to summon porters to take me to Butandiga, I told him to inform the chief at Butandiga that I should arrive on January 5, and for a fortnight thereafter would be glad to purchase reptiles and rodents. In particular I wanted hyrax. For this creature I employed the Swahili name of *pimbi*, adding by way of explanation, "you know, the little animal that has no tail and lives among the rocks." Shortly after my arrival at Butandiga, a man came into camp with four different species of shrew and rodent from each of which he had amputated the tail. In explanation he said that he had been told that I wanted animals without tails! On the 8th a party arrived bearing four huge clay cooking pots with which they had toiled up some distance from below. The pots were crammed full with many hundreds of rats and mice which were in all stages of decomposition and smelling abominably. I felt very sorry for the poor fellows who had doubtless been calculating their wealth at 5 cents (of a shilling) per rat, which was the standard price I paid. As it was I gave them a consolative which I would gladly have increased, but for the injurious effect it might have if the news spread that I was buying rats in such a condition.

Undoubtedly these people were rather stupid from a European standpoint, but I was careful to show no amusement. Unfortunately

my skimmers, gunbearer, and others who had gathered round, began to jeer until called to order. The men departed disappointed; later I learned that on returning home they engaged in an altercation with their chief who was so roughly handled that he was admitted to hospital. The incident is cited as it was the first of its kind in my experience, and serves to emphasize the necessity for exercising care in the sending of verbal messages which are liable to be misunderstood and have unfortunate repercussions.

Lukungu, Eastern Province.

On January 8, some natives arrived in my camp at Butandiga with chameleons (*C. senegalensis* and *C. g. gracilis*). As these are not montane species I enquired from the men as to where they had come from. They answered that they had come up from Lukungu further down the mountain. I have, however, failed to locate any such village on the Uganda Survey map M 54 though the place is undoubtedly in Bugishu district.

Bulanganya, Eastern Province. 1°12' N., 34°22.5' E. Alt. 6,084 feet.

Bulanganya is directly northeast of Butandiga in the adjacent valley down which the Simu River flows.

On January 12, 1934, I spent the day collecting along the river and in the neighbouring banana plantations, returning to the camp at Butandiga in the evening. The upper part of the valley is still well forested. Apart, however, from *Lacerta jacksoni* and *Rana f. chapini* which have forest associations, the lower vertebrates were of savanna types. A good many insects and mollusks were collected.

Budadiri, Eastern Province. 1°9.5' N., 34°20.5' E. Alt. 4,000 feet.

Budadiri, with its beautiful and commodious rest camp, is at the terminus of the road from Mbale. From it a broad and grassy path ascends to within 600 feet of Butandiga. Porters for the climb to the Summit are engaged here.

On January 17, 1934, we arrived at 8.50 A.M. to meet a lorry which was due at 10 A.M. to take us to Bukori. As it was two and a half hours late, we employed the time in buying snails and frogs from the children.

KENYA COLONY

Bukori, Nyanza Province. 0°48' N., 34°40' E. Alt. *circa* 6,000 feet.

Bukori is a gathering place where the Kitosh natives come to market their produce. It is on the motor road which skirts southern Elgon, from Mbale in Uganda to Kitale in Kenya Colony.

Camped from January 17 to 19, and again for night of February 6, 1934.

When I found the amphibian collecting at Butandiga disappointing, it occurred to me that Kirui's, where Robin Kemp collected in 1909, being type locality for a number of mammals of undoubtedly forest types, might be productive of the amphibians of which we were in search. With nothing but the name "Kirui's" to guide us, for nobody appeared to have heard of it, we set off from Budadiri shortly after noon and drove without breaking our fast until 8 P.M. Some distance off the road we could see the fitful flicker of firelight, evidently in a hut. Stumbling towards it in the darkness, I found the hut so well surrounded by a *boma* of thorn bush that I could not come near it. In answer to my shouts, however, a native opened the door and told me that I was indeed in the former chieftainship of Kirui. As the chief had died some years ago the name had fallen into disuse and he was surprised that I knew it. Next day I met two of Kirui's sons.

On awaking next morning, we found ourselves in a dusty, arid upland where thorn bush mingled with other types of scrub, and baobab trees formed an important feature in the landscape. Towards Mount Elgon, the undulating foothills, heavily stocked with cattle, are burnt over annually and in consequence exhibit gullying and other serious effects of erosion. The changes which this area appears to have undergone have been alluded to in the introduction of this paper.

Kemp, as I recollected from his itinerary (1911, pp. 92-98), had camped in a cave on the southern face of Mount Elgon at about 7,000 feet, later moving to a camp which he called Elgonyi at 9,000 or 10,000 feet. I decided to camp between these two locations. As soon, therefore, as porters could be obtained, we climbed the escarpment, passed Kemp's cave, and pitched our tents in the forest above. Specimens obtained around and below Kemp's cave, in what was formerly Kirui's chieftainship, were labeled 'Kirui', while those taken on excursions in, or adjacent to, the forest above our camp were labeled 'Elgonyi'.

Kirui, s. face of Mount Elgon, Nyanza Province. . Alt. 6,000-7,000 feet.

The name Kirui's, though no longer in use for this chieftainship since the death of Kirui, was used on my labels as the specimens are from precisely the same area as was made famous to mammalogists by Robin Kemp's work in 1909-1910. This locality figured largely on the 460 skins which he preserved during his five months' expedition. To make doubly certain that I had the correct location, photographs of the cave in which the natives said he had lived were submitted to Mr. Kemp, who kindly wrote confirming and corroborating their statement. The older natives remembered his visit, and we met the El Kony (Masai) family who occupied the huts in the cave immediately after his departure.

Camped from January 19 to February 6, 1936, above, and beyond, Kemp's cave beside the stream just above the falls.

No rain. Conditions in the forest very dry and, during the second week, grass fires burned on the hillsides adjacent to the forest. A goatherd and his flock and several other natives were said to have perished in these grass fires on Elgon about this time. For further description of this region see the Introduction, and also remarks under the last and next camp.

Topotypic material of the following mammals described from Kirui's was collected: *Crocidura b. elgonius*, *Galago s. albipes*, *Tachyoryctes ruddi*, *Dendromus acraeus*, *Leggada t. triton*, *Choeromys gregorianus*. We failed to get eight other species described from here, though most of them had been secured already at our camps on the western slopes of the mountain. In all, thirty-seven species of mammals were obtained during our short stay here, exclusive of those accredited to Elgonyi during the same period.

Not one of the six species of reptiles taken at Kirui's could be considered a rain-forest form. Of the three amphibians, however, *Rana m. venusta* has distinct forest associations while the leaf frog, *Hyperolius rossii*, recovered from the stomach of one of the *venusta* frogs, may possibly have. The scarcity of amphibian life was eloquent testimony to the disheartening prevalence of the drought.

The Kitosh came up from below with a certain amount of material, they were friendly and helpful and would doubtless have done more collecting had we been camped in a more accessible spot.

Elgonyi, s. face of Mount Elgon, Nyanza Province. Alt. 7,000-8,000 feet.

It is unfortunate that so important a mountain, known to the native tribes inhabiting it as Masaba, should, through a misunderstanding, have received the name of Elgon after one of the most insignificant groups, the Elgonyi or El Kony, dwelling on its southeast slopes. In view of the fact that there are no villages and only a few scattered huts in the largely-uninhabited area where we camped, it seemed advisable to continue to employ the same name as was used by Kemp for this region. Elgonyi was used, therefore, for labeling material actually taken in the forest or on the encroaching grasslands which abut upon it.

Camped from January 19 to February 6, 1936, near the stream in the forest.

For climatic conditions and other remarks see descriptions of the last two camps.

Topotypic material of the monkeys described as *Cercopithecus l. elgonis* Lönnberg and *Colobus a. elgonis* Granvik, both regarded as synonyms of other species, were shot in the forest. What were practically topotypes (Kemp collected up to 9,000 feet) of *Claviglis saturatus*, *Thamnomys s. insignis* (syn. of *T. s. elgonis*), *Cricetomys g. elgonis*, were taken, and topotypes of *Heterohyrax s. kempfi*, *Procavia h. daemon* and its synonym *P. daemon varians* which Granvik described from 7,000 feet. In all, twenty-two species of mammals were taken at this camp.

Topotypes were shot of the strange-looking barbet, *Gymnobucco b. cinericeps*, with brush-like tufts at the base of the culmen, as well as the shrike, *Laniarius l. castaneiceps*, and a series of the swallows, *Hirundo a. arcticincta*, described from these caves.

A good topotypic representation of the scarlet-headed rock lizard, *Agama a. elgonis*, were secured, but other reptiles were rare, and but one, *Lacerta jacksoni*, of the seven species taken was a forest form. We failed to find any frogs even along the stream, in fact the only amphibian taken was a toad, *Bufo r. regularis*, encountered in the forest.

Some children, urged by the headman, brought in quantities of mollusks, but the adult El Kony Masai did not assist us any better than they did Kemp.

Kaimosi, Nyanza Province. 1°45' S., 34°40' E. Alt. 5,300 feet.

Camped in a clearing in the remnant of rain forest on the property of the Friends Africa Mission. Our camp site was about a hundred yards from that occupied by Mr. H. J. Allen Turner, and about three hundred from the spot where Edmund Heller camped when he made his magnificent collection of mammals.

Camped from February 7 to March 11, 1934.

Kaimosi is in the region of the heaviest rainfall in Kenya, averaging 74.16 inches per annum during the last twenty years. It was for this reason removed to Kaimosi when the prolonged drought on Mount Elgon defeated our efforts to find the types of amphibia of which we were in search. On arrival at Kaimosi, however, Mr. F. N. Hoyt informed me that Kaimosi was also suffering from the widespread drought condition and that the millpond was lower than at any time during the 32 years since the mission was opened. On February 12 the longed-for rain arrived though the shower was relatively light. During the remainder of our stay, however, further showers fell on 9 days giving a total precipitation of 2.86 inches in 31 days. It proved sufficient to cause the frogs to emerge from their retreats and assemble in hundreds at the millpond.

In the last thirty years, much of the country around Kaimosi has undergone deforestation as a result of the immigration and settlement of large numbers of natives. Rides were even then being extensively cut in the neighbouring Kakamega forest to provide pit props for the mining operations in the vicinity. This magnificent forest, together with the Yala River and its tributary the Lukosa River, are zoologically very important as constituting the eastern limits of the range of many West African sylvicoline vertebrates. Series of topotypes of ten of these mammals were secured and a new one (*Nycteris nana tristis* Allen & Lawrence) added. Perhaps the most interesting point brought out was that of the essential unity of the faunae in the now separated Kakamega and Elgon forests. No fewer than 38 of the 48 species of mammals collected during our month at Kaimosi were previously taken by us on Mount Elgon or at its foot.

The local tribes, Wateriki and Maragoli, among whom the Mission is doing splendid work, were most friendly and coöperated so well in bringing in specimens that we felt we had secured a really representative collection of both mammals and reptiles during our relatively short sojourn among them.

Molo, Naivasha Province. 0°15' S., 35°45' E. Alt. 9,000 feet.

Molo is a station on the Kenya-Uganda Railway lying between Londiani and Nakuru stations.

Our lorry arrived after dark on the night of March 12 and we left early on March 13, 1934. Spent the night at the very comfortable Highland Hotel.

Molo is type locality for *Phrynobatrachus wittei* Angel, so I set out with a torch in search of some and was successful in capturing three adults. These show that the species should be called *Rana wittei* (Angel). In addition several *Phrynobatrachus keniensis* were secured; both species have a similar distribution in the Kenya-Aberdare highlands.

Kikuyu, Ukamba Province. 1°15' S., 36°40' E. Alt. 6,695 feet.

Kikuyu is a station on the Kenya-Uganda Railway lying between Naivasha and Nairobi stations.

Our lorry arrived after dark on the night of March 13 and left early on March 14, 1934. We stayed with Dr. and Mrs. J. W. Arthur at the Church of Scotland Mission.

In swampy pasture land on the mission property several species of frogs were captured by Mrs. Loveridge. They included both *Phrynobatrachus keniensis* and *P. kinangopensis* which occur together.

Nairobi, Ukamba Province. 1°17' S., 36°50' E. Alt. 5,452 feet.

Nairobi, the capital of Kenya Colony, is 260 miles southwest of Kisumu and 327 miles inland from Mombasa.

Arrived early on March 14 and left on March 20, 1934.

My time was chiefly occupied with making arrangements for the second part of the trip. One evening, however, was spent on the Athi Plains southwest of the station, just outside the town, in search of *Hyperolius symmetricus*, *platyrhinus*, *pictus* (part), *asper*, *ferniquei* and *coeruleopunctatus* for all of which this is the type locality. As a result of studying the series of topotypes which we secured, I came to the conclusion that all are referable to either *undulatus* (Boulenger) or *striolatus* Peters.

Kibwezi, Ukamba Province. 2°23' S., 37°55' E. Alt. 2,985 feet.

Kibwezi is a station on the Kenya-Uganda Railway lying about midway between Magadi Junction and Tsavo station. My tent was pitched beneath a big tree just east of, and only a hundred yards from, the station.

Camped from March 22 to March 30, 1934.

No rain; heat very trying.

Kibwezi might be said to have become known to zoölogists as a result of the activities of two German planters—Huebner and Scheffler. One of their finds, a gecko of the genus *Lygodactylus*, was described as a race of *fischeri* of the West African forests. This led me to suppose that there might be a remnant of virgin forests at Kibwezi. Accordingly, I enquired of Mr. C. W. Hobley, who replied: "There is a relic of rain forest there, for the original stream was over part of its course covered by a fairly recent lava flow and it springs out in all sorts of odd places and then disappears again under the lava. Where it oozes out, patches of fine forest occur. It is a good place for snakes."

Many of the fine trees are only enormous acacias, however, and the patches of forest would probably be classed as gallery forest. The lava, which covers much of the country like a blanket, is overgrown with creepers and scrub. The creepers often conceal deep fissures. In such a type of terrain collecting is exceedingly difficult for snakes and lizards can retire into crevices where they are secure from molestation; while birds, if shot, are often impossible to recover. To the east and south lies the laterite country which, as savanna or desert, and supporting its rather representative fauna, stretches away to Voi and beyond.

Much of the material sent to Berlin by Huebner and Scheffler, was described as new, though recently many of these names have been reduced to synonymy. Kibwezi thus became type locality for *Lycan huebneri*, *Procarvia scheffleri*, *Glaucidium c. scheffleri*, *Parisoma p. orientale*, *Cyanomitra o. neglecta*, *Coronella scheffleri*, *Micrelaps bicoloratus*, *Lygodactylus f. scheffleri*, *Mabuya diesneri*, *Chiromantis pygmaeus*, *Hyperolius scheffleri* and partly for *H. coeruleopunctatus* and *H. ujijensis*. Of these I was only successful in securing topotypes of a snake, lizard and two frogs.

Tsavo, Coast Province. 3°0' S., 38°29' E. Alt. 1,525 feet.

Tsavo is a station on the Kenya-Uganda Railway where the latter crosses the Tsavo River, due north of Voi station. I occupied a vacant and semi-ruinous house two hundred yards east of the station.

Remained from March 30 to April 6, 1934.

No rain. Heat so withering as to render collecting between 9 A.M. and 4 P.M. futile and out of the question. The local natives said that no rain had fallen for a year.

No Europeans live at Tsavo, the station being maintained to water the engines by tanks filled from the Tsavo River. Tsavo consists of a group of huts occupied by the railway staff and their families, the men operating the tanks and keeping the permanent way in repair. Around this desolate little outpost lies the desert-like, eroded country which manages to support dense thickets of thorn bush and quite a little game. The desiccated conditions resulting from the long-delayed arrival of rain, naturally militated against collecting, for most amphibians and many species of reptiles were aestivating. A few miles distant from the station are numerous rocky kopjes which form quite a feature of the landscape.

Tsavo, or the Taru desert, is type locality for nearly a dozen races of birds but only one reptile, *Lygosoma gromicri* Angel. I concentrated on hunting for this skink but only obtained *Riopa m. modestum*. On the spot one wishes that the type locality was a little more explicit; confronted by a landscape stretching to hills or the horizon in every direction, one wonders if the skink was taken along the river or on some distant kopje.

As Tsavo is herpetologically practically unknown, a list of the species obtained during the week which I spent there will give a good picture of the herpetofauna. The species collected were: *P. sinuatus*, *C. s. fuscorosca*, *P. biseriatus*, *M. bicoloratus*, *D. angusticeps*, *H. brookii*, *A. a. lionotus*, *L. l. revoili*, *M. brevicollis*, *M. q. obsti*, *R. m. modestum*, *Rana o. oxyrhynchus*, *P. natalensis* and *P. acridoides*. The three species of frogs were all taken in a runnel of water which was used to irrigate the station gardens.

Voi, Coast Province. 3°23' S., 38°35' E. Alt. 1,833 feet.

Voi is an important administrative centre and station on the railway 104 miles northeast of Mombasa. Thanks to the kindness of Mr. A. B. C. Smith I was permitted to occupy the vacant house on Msinga Estate, about five miles east of Voi station and conveniently situated close to gallery forest.

Arrived after dark on April 6 and remained till early on April 13, 1934.

No rain except for a heavy downpour on the day of arrival.

At the time of my visit, the Voi River was represented by a broad sandy bed. Along much of its course this was flanked by very dry gallery forest composed of magnificent trees interspersed with acacia. Most of my hunting was done in this forest while the river bed supplied a highway by which one could get about, much of the country being impassable at this season on account of the rank growth of grass.

Topotypes of *Dipodillus percivali* (a synonym of *pusillus*), *Acomys i. ignitus*, *Francolinus h. hildebrandti*, *Agama r. septentrionalis* and *Geocalamus acutus* were collected. Actually it was on account of the latter that I made a stay at Voi for this strange amphisbaenid has not been collected since the types were described more than twenty years ago. It does not appear to have any present association with forest for most of the sixteen examples taken were found in sandy soil on the flats of the Msinga Plantation, though near to the Voi River.

In all, 13 species of mammals, 21 of birds, 31 of reptiles, and 2 of amphibia (testimony to the drought), were taken during the week. From this evidence it may be stated that the Voi fauna is essentially that of the coastal belt with an admixture of northern thorn-bush steppe forms. The only rain-forest species is represented by three examples of *Siaphos kilimensis* which escaped remark in my notes; possibly overlooked with *Riopa m. modestum* to which they bear a superficial resemblance, or else mislabeled on Mount Mbololo where *kilimensis* is common. *Lygodactylus scheffleri* was taken in the gallery forest along the Voi River where *L. p. picturatus* and *L. p. mombasicus* meet.

Mount Mbololo, Coast Province. 3°15' S., 38°25' E. Alt. 4,800 feet.

Mount Mbololo is in the Teita Mountains about ten miles from Voi. Unfortunately, in view of the fact that Teita is the accepted Government spelling, I followed Peters and Gregory in spelling it Taita both on my labels and in this series of reports. Camp was pitched at the edge of the remnant of forest capping the summit, after nine days I descended to about 3,800 feet where I remained for a week awaiting news of the breaking of the rains at the coast.

Camped on summit from April 13 until April 23, then halfway down the mountain from April 23 until April 30, 1934.

No rain, but at the upper camp such a heavy nocturnal condensation occurred as to leave the trees dripping for hours. The blanket of fog, which began to gather about dusk, enveloped the summit until 8 or 9 A.M. Drought conditions prevailed at the lower camp.

It is most important that the difference in location of these two camps should be borne in mind for the forest fauna at the summit was totally different from the encroaching fauna in the eroded area of rock and scrub at 3,800 feet. The fauna of the latter was essentially that of Voi, in fact 17 of the 32 species of reptiles taken on the mountain were common to Voi.

Whether the new skinks described as *Acontias percivali* from the foot of the mountain are survivors from a former forested area is not clear. In the forest four white-eyes proved to be new (*Zosterops silvanus*), their nearest relative, *Z. winifredae*, having been described from the Usambara Mountains, with whose fauna that of Mount Mbololo forest shows distinct affinities.

Forms associated with the rain forest of the mountain top were: *Cnemaspis a. africanus*, *Lacerta jacksoni*, *Siaphos kilimensis*, *Chamaeleon f. tavetensis*, *Boulengerula taitanus* (type series), *Rana f. chapini* and *Arthroleptis adolfriederici*.

Topotypes were collected of *Lasiopygia a. kima* (synonym of *C. m. kibonotensis*), *Petrodromus s. sangi*, *Epimys taitae*, *Pelomys f. iridescens*, *Turacus hartlaubi crissalis* (invalid), *Turdus o. helleri*, *Pogonochla m. helleri*, *Mabuya q. hildebrandtii* (synonym of *M. q. obsti*), *M. planifrons* as well as its synonym *M. taitana*. Whether either of the species of *Hyperolius* collected will later prove to be referable to *H. glandicolor* and *H. striolatus*, which were described from Teita by Peters, remains to be seen.

Malindi, Coastal Province. 3°13' S., 40°8' E. Alt. 70 feet.

The historical old port of Malindi lies 78 miles by road north of Mombasa. Collecting was done on both outward and return journeys.

On the outward journey Malindi was reached after dark at 7 P.M., May 1. I spent the night at the comfortable Palm Beach Hotel which is practically on the shore of the sandy bay to the north of the town. Various insects, including a couple of hawk moths (*Euchloron m. megaera*) were taken at light. After breakfasting at 6.30, I left at 7 A.M. the following morning.

On the return journey Malindi was reached on June 28, collecting was carried out till late on Saturday night, June 30. We left in torrential rain on July 2. Camp was pitched close to the shore about a furlong south of Palm Beach Hotel on a site which has since been built over.

According to FitzGerald (1898) the average rainfall is 45" per annum. I was told however, that during May and June of this year (1934) the fall had equalled the average precipitation for the half year of January to June. Except on Saturday, frequent and heavy downpours occurred daily during our stay.

Swamps had formed close to our camp. By wading in these at night, and aided by a torch, I secured thirteen species of frogs and toads in three evenings.

Malindi being type locality for *Anthus melindae* and *Urobrachya a. zanzibarica*, considerable time was spent in unsuccessfully hunting for these birds. The weaver had been seen on the march from Golbanti to Malindi only a few miles north of the town. During our brief stay, we failed to run across *Zamenis fischeri* (= *Coronella s. semiornata*) described from here by Peters, though we took eight other species of snakes and eight of lizards. Among the latter were topotypes of *Ablepharus b. africanus* Sternfeld, which occur on the coral rag at the south end of the bay.

The assistance rendered by the Giriama and Swahili was negligible, for they had scarcely time to become aware of our requirements before we were on our way again. The Giriama are probably very helpful in bringing in material.

Golbanti, Coastal Province. 2°27' S., 40°7' E. Alt. 500 feet.

Golbanti, formerly called Burabin (or Borabin) from the lake of that name in its vicinity, is a village lying in a bend of the Tana River where there is a pontoon ferry.

Stayed in the Rest House on May 2 on the outward journey, and over the week end from June 21 to 25, 1934, on the return trip.

On May 2 we reached the village at 4 P.M. when I broke a 9½ hours fast occasioned by the difficulties of the road from Malindi resulting from the few heavy downpours which inaugurated the breaking of the rains. The lorry was bogged for as long as two hours in one spot. The high humidity accompanying a temperature of about 90°, the swarming flies and hordes of mosquitoes gave a very unfavourable impression. We loaded up and left early next morning but there were most vexatious delays at the ferry where the truck had to be unloaded again and the loads carried through tenacious mud and down a treacherous slope.

Conditions were pleasanter on my return visit when I arrived by canoe. Two months of incessant rain had done much to reduce the temperature.

The seven species of mammals preserved were common coast-forms. Only three birds were shot, viz. *Pelecanus rufescens*, *Franco-linus s. granti* and *Pternistes a. leucoparacus*, the latter almost typical of a race that is rare in collections. Though not uncommon, these bush fowl were very wary and difficult to shoot.

Some 200 specimens of amphibia, representing 13 species, were collected in two days; these included paratypes of two new species of sedge frog, viz. *Hyperolius ahli* and *H. milnei*. Of reptiles 15 species were taken, all referable to common and widely distributed forms except for a snake, *Coronella coronata*, and paratypes of the recently described skink *Riopa tanae*.

The Pokomo villagers, though pleasant and friendly, appeared disinclined to aid in collecting. The women, and a few of the men, were very busy in their rice fields which surrounded the numerous swamps. In general the men appeared indolent, probably they are heavily parasitised, particularly with malaria. The children brought in many frogs, but did not collect intelligently; doubtless they might have been trained had my stay been longer.

Witu, Coast Province, 2°21' S., 40°30' E. Alt. circa 300 feet.

Witu, formerly the headquarters of an Arab Sultanate, is still a township of some importance situated southeast of Lamu Island.

Spent the night of May 3 in a swamp near Witu, while on the return journey I was the guest of Mr. R. D. Milne from May 31 to June 4, 1934.

Heavy downpours were frequent and had turned much of the countryside into swamps and lakes.

After leaving Golbanti at 7.30 A.M. on May 3, it took our lorry twelve strenuous hours to cover twenty miles of black cotton soil in the Tana delta. The delay was due to our being mired up to the differential four times, each occasion necessitating the entire removal, portage, and repacking of the loads on the truck. Finally, at 7.30 P.M., fortunately in moonlight, we sank up to the axles in a shining sheet of water which concealed the treacherous mud. Round us frogs of many species chorused, and among the medley of cries I noted an unfamiliar, musical call which I rightly surmised was that of *Leptopelis concolor* so recently described from Witu by Dr. Ahl. I captured several that night, for we had to remain where we were, two miles from Witu which is 177 miles by road north of Mombasa.

On my return journey I had planned to stay at a village called Mombo Sasa, about five miles north of Witu and adjacent to the forest. The latter is almost rain forest, certainly much wetter than most of the patches of coastal forest. On arrival at Mombo Sasa in a deluge of rain that had scarcely abated all morning, I was met by Mr. R. D. Milne, who graciously insisted on my staying at his plantation. I was nothing loath, having just walked nineteen miles of which eight, according to my diary, were through water which made one's knees ache. In several places on the road it had been knee deep for long stretches and over one stretch it was up to my waist. Unfortunately I had already written Mombo Sasa on my labels. As, however, the plantation is slightly nearer the better known Witu than it is to Mombo Sasa, I have treated all material from this area as from Witu.

Even in the forest the soil is very sandy and consequently admirably suitable to the growth of palmyra (*Borassus flabellifer*) and doom palms (*Hyphacne thebaica*) which constitute such an important part of the flora. The torrential rains had formed extensive pools in suitable depressions, and it was in one of these that I encountered large numbers of a small green frog (*Hyperolius milnei*) for the first time. A rare sphingid (*Likoma crenata*) was also collected at Witu.

Lamu Island, Coast Province. 2°16' S., 40°54' E. Alt. 30 to 250 feet.

Camp was pitched under the mango trees on the site of the abandoned wireless station half-a-mile south of Lamu township.

Camped from May 5 to 15, 1934.

Heavy rain, amounting to 11.83 inches, fell during my stay: only two days were wholly fine, but the greatest downpours occurred during the night. I am indebted to C. E. Whitton, Esq., long resident on the island, for the rainfall statistics covering a period of twenty-seven years (1907-1933). They vary from 16.51 to 48.46 inches with an average of 30.44 inches per annum. May averages 16.39 inches and is usually the wettest month in the year, so that the time selected for my brief visit was most propitious. June to August constitutes the coolest season of the year with a minimum temperature of about 63°.

The island is nine miles long and six broad at the widest part. Not far southeast of my camp the sand dunes rose to a height of 150 feet. Most of the interior of the island, however, is a fairly level sandy plain which is given over to the cultivation of coconuts. Lamu appears to be nothing but a gigantic sandbar on a raised coral reef, without any rock or soil other than that which has been brought to it by human agency. Under these conditions nothing approaching forest occurs on the island.

Two mammals, a baboon (*Papio ibeanus*) and mongoose (*Helogale vetula*), described as from Lamu by Oldfield Thomas (1911), do not occur on the island though present on Manda Island and the adjacent mainland. At the time of my visit there were three *Helogale vetula* living in captivity in the town, one being offered to me for sale. It seems quite possible, therefore, that the types of the baboon and mongoose were purchased from natives who had brought them from the adjacent mainland. Alternatively 'Lamu' may have been used in the sense of Lamu district, which includes the neighbouring littoral. Lamu is also type locality for a woodpecker (*Campethera n. pallida*) which indeed I saw, but was unable to shoot on account of its wariness.

Three snakes have been described from Lamu, the first of these, *Lycophidion jacksoni* Boulenger, has long been recognized as a synonym of the widespread *L. c. capense*. The other two were not localized when described, but their author (Sternfeld) remedied this the same year (1908) by attributing them to "Lamu Island." One of these *Amplorhinus taeniatus* I have shown to be a synonym of *Hemirhagerhis kelleri*, the other *Rhinocalamus meleagris* I believe to be a synonym of *Micrelaps bicolor*.

Manda Island, Coast Province. 2°16' S., 40°56' E. Alt. 10 feet.

The altitude given is that of my camp at Ras Kitau. The tents were pitched in the open just thirty feet back from the usual tide line.

Camped from May 15 to 20, 1934.

Manda Island had undoubtedly enjoyed the same rainstorms as Lamu in the week prior to our arrival. During our stay there was only one heavy downpour, this occurred on May 18, and lasted several hours. The nights were cloudless, the sky studded with stars. As there are no springs or freshwater wells on the island, our supply was daily brought across from Shella.

Manda lies northeast of Lamu Island from which it is separated by a relatively narrow channel. Unlike Lamu, however, it is composed of coral rag, which is exposed in many spots but in others is covered by a good depth of rich red soil. Today, most of the island is under dense scrub with acacia predominating. Where the growth is recent it is often impenetrable, but game paths are numerous under the taller acacias whose spreading boughs form a canopy overhead. At the time of our visit the more open spaces were clothed in freshly-sprouted grass whose vivid green in contrast with the bright red soil presented a pleasing picture. At the height of the dry season the island is probably arid and uninviting.

Three birds have been described from Manda, viz. *Sylviella w. minima*, *Tschagra j. mandana* and *Lamprocolius c. mandensis*, but we had to conserve our ammunition and had come to the island in search of topotypic material of the little worm snake, *Leptotyphlops boulengeri*, known only from the type secured here by Voeltzkow over thirty years ago. Despite earnest search, several days elapsed before we found one, and, as we had already secured a series on Lamu, we made arrangements for our immediate departure. Topotypes were collected of the little skink, *Ablepharus b. africanus*, which is abundant on the maritime rocks along the shore.

Owing to the absence of water, there are normally no natives resident on the island. Actually at the time of our visit, as a result of pools having been formed by the heavy rains, several families were temporarily living in scattered huts. These were situated in cultivated plots which the owners had come over to guard from the depredations of baboon and buck. They could spare no time for collecting because they lacked the inclination.

Wange, Coast Province. 2°0' S., 40°54' E. Alt. circa 50 feet.

Wange (Wangi) is the site of a plantation formerly owned by the late Gustav Denhardt: it lies on the north shore near the head of Mongoni Creek opposite, yet due north of, Manda Island.

When Herr Denhardt, who lived on Lamu, gave a collection of reptiles to Chanler, Wange became type locality for two species of snakes (*Typhlops mandensis* = *T. s. mucroso*, and *Simocephalus chanleri*, now known as *Mehelya c. chanleri*). Unfortunately in describing them, Stejneger (1893) gave the type locality as Wange, Manda Island, whereas Wange is two days sail from Manda even with the blustering southwest monsoon behind one.

I had planned to visit Wange where a patch of virgin forest, the most northeasterly in Kenya, is said to be surviving. The time factor intervened, however, for I found that though I might get there in two days, I should be fortunate if I could get back to Lamu in ten days of tedious tacking. When I proposed walking back I was told that it was extremely doubtful if porters could be found at Wange willing to undertake the journey at this season of the year when, on account of the flooded state of the country, it might be impossible to get through on foot. Though Wange is only about forty miles from Lamu in a direct line, the route is a tortuous one because of the many detours necessary to skirt the numerous inlets and mangrove swamps. Under the circumstances I had to abandon this part of the itinerary.

Pokomoni, Coast Province. 1°55' S., 40°50' E. Alt. circa 50 feet.

Pokomoni appears to be about ten miles beyond Wange and I had to relinquish my hopes of visiting it for the same reasons given above.

The 39 mm. frog collected at "Pokomonie" by Gustav Denhardt, and described by Ahl as *Chiromantis albescens*, was doubtless taken in the vicinity of Pokomoni Creek which discharges into Mongoni Creek. As this insignificant stream is to be found on few maps, and as Pokomoni, literally 'the place of the Pokomo people', might be assumed to be the present location of the tribe along the Tana River where Herr Denhardt also collected, it seems worth drawing attention to its position here.

I have synonymized (1929) *albescens* with *C. p. petersii* on account of its length, but from the position of Pokomoni it seems possible that it might be a two-thirds grown example of the northern race, *C. p. kelleri*, which is only distinguishable by its larger size.

Kililana, Coast Province. 2°12' S., 40°47' E. Alt. *circa* 20 feet.

Kililana was the name of another of Denhardt's plantations long since returned to grass and scrub. I located the foundations of the planter's home which was at the head of a dismal mangrove creek and surrounded by swamps. It lies opposite Lamu Island.

A boat which I had chartered, picked me up on Manda Island and landed me at Kililana at 10 A.M. on May 21, 1934. Left at 1 P.M.

Kililana is type locality of *Hyperolius rubripes* Ahl which I believe to be a synonym of *H. sansibaricus* (Pfeffer). Midday on the equator is not the best time to go frogging and though I spent an hour wading waist deep in a swamp about a mile from the planter's old home site, I only captured a dozen *H. milnei* and failed to secure topotypes. Later I was to get *sansibaricus* at nearby Mkonumbi.

Mkonumbi, Coast Province. 2° 16' S., 40° 42' E. Alt. *circa* 50 feet.

Mkonumbi is at the head of a creek opposite Lamu Island. During my enforced stays there I put up at the Government rest house.

Remained from May 21 to 23, and again from May 28 to 30, 1934.

During most of the year there is a dhow service maintained between Lamu Island and Mkonumbi; though relatively near, the configuration of the coast with its sandbars, mangrove swamps and estuaries often results in a tedious journey so that it was nearly 11 P.M. before I reached the town and its attendant mosquitoes. It is situated in low-lying, often flooded, sandy flats which on the landward side are more or less studded with shrubs and small stunted trees.

Though type locality for *Agama gregorii* Günther, a synonym of *A. atricollis*, I had no intention of staying longer than was necessary to obtain porters. It was indeed fortunate for me that Captain Clive, District Officer of Lamu, was passing through Mkonumbi at the time of my first visit. It is thanks to his kindness that I am not there still! Though the local people were in many instances drawing famine relief, and there were plenty of idlers to be seen in this large town, and though I offered double the usual pay for portage, these Swahili held out for more. On my return from Lake Peccatoni on May 28, I had the greatest difficulty in getting my loads shifted to Witu, and it was only accomplished in instalments lasting over a period of three or four days.

Peccatoni, Coast Province. 2°25' S., 40°43' E. Alt. circa 100 feet.

Lake Peccatoni, spelt by Boettger (1913) Peccetoni, and shown on some maps as Mpekatoni, is ten miles south of Mkonumbi. Our tents were pitched beneath three great mango trees about a quarter of a mile southeast of the village and a quarter of a mile south of the lake.

Camped from May 23 to 28, 1934.

Torrential rain on all except two days of our brief visit.

This side trip was made to ascertain the conditions under which the caecilian described as *Bdellophis unicolor* by Boettger was surviving, in view of the fact that its known relatives are practically unknown outside of rain forest. As a result of the study of the 130 specimens collected (heretofore *unicolor* has only been known from the type) it was found that *unicolor* is a synonym of *Dermophis gregorii*, a mud-dwelling species.

Peccatoni derives its name from a great tree on the northeast side of the lake. In the days of the Witu Sultanate much of this country was under cultivation by slaves. Evidence of this is to be seen in the clumps of magnificent old mango trees which one encounters unexpectedly in the bush. Doubtless in pre-Arab days much of the region may have been forested with trees of the type occurring in the Witu and Sokoki Forests.

The big saucer-shaped depression occupied by the lake is continued at the south end in a series of swamps. The slightly elevated country surrounding it is well wooded with scattered borassus and doom palms, and grass, either long or short according to the poverty of the soil, clothes the ground beneath. While the elevated ground is of a sandy nature, in the hollows black cotton soil predominates.

At the time of our visit the lake was about two miles long and three-quarters of a mile broad. It waxes and wanes according to the season. The old chief told me that in bygone days it was much more extensive and broke through to the sea at its south end in years of exceptional rain. Hippopotamuses formerly lived in it but have since been shot out. During the dry season it is said to be crowded with waterfowl.

The moribund local natives, descendants of slaves, were disinclined to make any effort to secure caecilians though they admitted their abundance. On the return of their chief with famine rations, they turned to and brought in the whole series at the rate of 30 cents (6c U. S.) per caecilian for the first hundred, 10 cents thereafter.

Kau, Coast Province. 2°28' S., 40°28' E. Alt. *circa* 100 feet.

Kau is on the banks of the Ozi River where it is connected with the Tana by the Belazoni (*Belezoni, Belesoni, Belzoni*) Canal. Since the cutting of the canal the Ozi has become the main outlet of the Tana River, its own mouth being silted up with sandbars and choked by vegetation during the greater part of the year.

Arrived at noon on June 4, spent night in rest house on river bank, left by canoe on June 5, 1934.

Only ceased raining for about two hours the first day, and was raining when we departed at 7.30 A.M. the following morning.

We had left Witu in pouring rain at 8 A.M. on a trail to Kau, for the path from Witu to Ngatana, partly through forest, was said to be quite impassible. We had proceeded but a short distance when we came to the first of several waist-deep streams which had to be forded. On nearing the Tana delta we found great stretches of country inundated by slowly-flowing water. The broadest of these was about fifty yards across, and for a distance of about fifty feet in its centre I was walking up to my armpits. It was a strange sight to see the straggling line of porters negotiating this stretch, several of the shorter men were up to their necks, one being over his mouth had to be supported through by two others. Still nearer Kau the trail became unbelievably slippery, three men fell with their loads so that their contents were more or less immersed in muddy water. Fortunately the cartridges, though entirely submerged, did not suffer from this treatment as I took steps to have them dried immediately upon arrival. On either side of the path were freshly-made graves of which I counted a dozen. Kau being hemmed in by swamps, the people had nowhere else to bury their dead. As we walked through the village I noted a number of obviously sick natives lying beneath the eaves of their huts. I thought that an epidemic must be raging but was told that they were only suffering from fever. Conditions have not changed since Gregory's visit when his men demanded to leave Kau "as the mosquitoes rendered their lives unbearable." Fortunately Japan has come to the rescue by furnishing a modern amenity in the shape of a cheap mosquito bar with one of which each of my 'boys' was supplied.

The chief gathered the children together and in the short time of about three hours they brought in 48 caecilians as well as 14 examples of an undescribed species of skink (*Riopa tanae*.)

Belazoni, Coast Province. 2°32' S., 40°18' E. Alt. *circa* 150 feet.

Belazoni (Bellazoni, Belezoni, Belesoni, Belzoni, M'Beledzoni) is the site of a plantation in the fork formed by the Belazoni Canal and old Tana River.

Spent the night of June 5, 1934.

Heavy showers occurred during the course of the journey in a dug-out from Kau, and also as the loads were being carried up to the house where Mr. Pettley entertained me. A bat (*Mops osborni*) collected here, proved to be the first record of the occurrence of this Congo species on the coast.

Laini, Coast Province. 2°30' S., 40°12' E. Alt. *circa* 200 feet.

A small Pokomo village on the south bank of the Tana River.

Spent the night of June 6, 1934.

Infrequent downpours occurred during the day.

Just before sunset I collected a couple of snakes; after dark, aided by an electric torch, hunted amphibia in the rice swamps.

Ngao, Coast Province. 2°24' S., 40°8' E. Alt. *circa* 250 feet.

Site of a large village and a German Mission station where I was hospitably entertained for the night.

Spent the night of June 7, 1934.

It took our heavily laden canoe 12 hours to negotiate the swift currents of the flooded Tana between Laini and Ngao. It was long after dark when I arrived and broke a 13-hour fast.

Garsen, Coast Province. 2°17' S., 40°1' E. Alt. *circa* 275 feet.

The position given is only approximate as this relatively new village by the Garsen Ferry, which is under construction, is not on available maps.

Spent the night of June 8, 1934.

I marched from Ngao, after crossing the Tana by boat, while the dugouts negotiated the tortuous bends of the river. I went out collecting in the late afternoon but got little. The Pokomo at this village were unfriendly and unhelpful, in marked contrast to those at Ngatana from whom I parted with real regret.

Wema, Ngatana, Coast Province. 2°14' S., 40°1' E. Alt. *circa* 300 feet.

Camped beneath a large tree about 200 yards north of the new village of Wema, and about 70 yards east of the Tana River.

Camped from June 9 to 21, 1934.

Heavy rainstorms swept across the country from time to time but the intervals between them increased so that we had several entirely fine days.

Ngatana was made known to zoölogists through the collections made there in January, 1893, by that intrepid geologist, the late Professor J. W. Gregory. I had some difficulty in locating the place for the old village of Ngatana had been abandoned as a result of some epidemic. The site is marked by an extensive grove of fine old mango trees beneath which are three or four huts. I was informed that as a result of the many deaths occurring among the Wapokomo in these parts, the Medical Officer of Heath had recently ordered the abandonment of many scattered settlements in the vicinity. The population were then concentrated in a new village on a specially selected site; this village they had named Wema.

On arrival, I at first endeavoured to differentiate my material as between the old type locality of Ngatana, and the new village of Wema which is about a mile away. Both are situated in an area, or district, vaguely referred to as Ngatana (Engatana on some maps). When, however, the natives began bringing in specimens from intermediate points and the country round about, I was forced to abandon any distinction and thereafter labeled everything Ngatana.

Surrounded by swamps, teeming with mosquitoes, it was little wonder that one after another Gregory's men died, four of my five native assistants went down with fever during our stay here. For a detailed description and pictures of Ngatana, I cannot do better than refer the reader to Gregory's book, "The Great Rift Valley."

As references have been made already to the peculiarities of the Tana fauna, it is only necessary to mention here that Ngatana was included in the itinerary because it was type locality of a gecko, *Bunocnemis modestus*, and caecilian, *Dermophis gregorii*, known only from the types though Gregory discovered them over fifty years ago. We were fortunate in capturing topotypes of both as well as a series of a new skink, *Riopa mabuiformis*, on the site of old Ngatana.

Karawa Camp, Coast Province. 2°35' S., 40°8' E. Alt. circa 100 feet.

Karawa (Kurawa, Krawa) is a recognized camping place just north of Lake Karawa in the uninhabited stretch of country south of the Tana River. Camped beneath a group of baobabs.

Camped for the afternoon and night of June 25, 1934.

No rain on the 25th., though the long grass soon soaked us nearly to the waist. On leaving Karawa next morning we had to wade through a chest-high swamp at the very start. Though only a light shower occurred, the march to Marareni was a grueling one of about six hours. I saw Peter's gazelles, oryx, dikdik and countless hundreds of pelicans, wood ibis, and other aquatic birds. The porters, an hour behind me, saw an elephant which stopped and looked at them before making off.

Marareni Camp, Coast Province. 2°50' S., 40°10' E. Alt. 70 feet.

Marareni (Marereni) is another camping ground on the site of an abandoned village.

Camped for the afternoon and night of June 26, 1934.

The march from Marareni surpassed in misery all others of the whole trip. I had risen as usual at 3.45, and we left as soon as it was light at 5.30 a.m. The route lay across swampy flats and salt marshes under very exposed conditions where we were lashed by torrents of driving rain. One such downpour lasted without cessation from 9 till 10.30 a.m. At one point it was necessary to wade through knee-deep, foul-smelling, black mud in a mangrove swamp. The only alternative an extensive detour inland for which we were too weary.

Gongoni, Coast Province. 3°5' S., 40°10' E. Alt. 70 feet.

Gongoni, right on the coast, is an important salt-distilling centre. Through the courtesy of the owners, I was allowed to pitch my tent in the centre of their employees' village — about the only cleared and level ground to be found in the vicinity, and conveniently near to a hut in which my cook was able to light a fire without having it extinguished by one of the frequent rainstorms.

Camped for the afternoon and night of June 27, 1934.

Spent an hour or more hunting for blind snakes in the cultivated patches about the European's house. Interesting earthworms (*Polytoreutus multiporus*) were among the things obtained here.

Mombasa, Coast Province. 4°3' S., 39°40' E. Alt. 70 feet.

The well-known port of entry and departure for Kenya Colony.

Stayed at the Manor Hotel from July 2 to 9, 1934.

While awaiting the arrival of the overdue S. S. Durham Castle, I put in a couple of days collecting on the mainland opposite Kilindini Harbour and at nearby Changamwe.

BIBLIOGRAPHY

BARBOUR, T. and LOVERIDGE, A.

1928. "A Comparative Study of the Herpetological Fauna of the Uluguru and Usambara Mountains, Tanganyika Territory, with Descriptions of new Species." *Mem. Mus. Comp. Zoöl.*, **50**, pp. 87-265, pls. i-iv.

BUXTON, D. R.

1937. "A Natural History of the Turkana Fauna." *Journ. E. A. & Uganda Nat. Hist. Soc.*, **13**, pp. 85-104, pls. A-H and i-iii.

CHAMPION, A. M.

1933. "Soil Erosion in Africa." *Geog. Journ.*, **82**, pp. 130-139.

FITZGERALD, W. W. A.

1898. "Travels in the Coastlands of British East Africa and the Islands of Zanzibar and Pemba." London. 8vo.

HANCOCK, G. L. R. and SOUNDY, W. W.

1929. "Notes on the Fauna and Flora of Northern Bugishu and Masaba (Elgon)." *Journ. E. A. & Uganda Nat. Hist. Soc.*, No. 36, pp. 165-183, pls. i-vi.

HOBLEY, C. W.

1933. "Soil Erosion: A Problem in Human Geography." *Geog. Journ.*, **82**, pp. 139-150, pl. —

JOHNSTON, SIR HARRY

1902. "The Uganda Protectorate." **1** and **2**. London. 4vo.

KEMP, ROBIN

1911. "On the smaller Fauna of Mt. Elgon." *Journ. E. A. & Uganda Nat. Hist. Soc.*, No. 2, pp. 92-98.

LÖNNBERG, EINAR

1922. "Sammlungen der Schwedischen Elgon-Expedition im Jahre 1920. 6. Reptiles." *Arkiv Zool.*, **14**, No. 12, pp. 1-8.

LOVERIDGE, ARTHUR

1933. "Reports on the Scientific Results of an Expedition to the South-western Highlands of Tanganyika Territory. I. Introduction and Zoögeography." *Bull. Mus. Comp. Zoöl.*, **75**, pp. 1-43, pls. i-iii.

LUGARD, E. J.

1933. "The Flora of Mount Elgon." *Roy. Bot. Gardens, Kew Bull. Misc. Inform.*, pp. 49-106.

MOREAU, R. E.

- 1933 "Pleistocene Climatic Changes and the Distribution of Life in East Africa." *Journ. Ecol.*, **21**, pp. 415-435, map.

NICHOLSON, J. W.

1929. "The Influence of Forests on Climate and Water Supply in Kenya." Forest Dept. Pamphlet 2. Nairobi.
1930. "Note on the Influence of Forests on Climate and Water Supply in Uganda." Supp. to Kenya Forest Dept. Pamphlet 2. Entebbe.

PARKER, H. W.

- 1932a. "Two Collections of Reptiles and Amphibians from British Somaliland." *Proc. Zool. Soc. London*, pp. 335-367, figs. 1-3.
- 1932b. "Scientific Results of the Cambridge Expedition to the East African Lakes 1930-1931. 5. Reptiles and Amphibians." *Journ. Linn. Soc. London, Zool.*, **38**, pp. 213-229, figs. 1-10.
1934. "A Monograph of the Frogs of the Family Microhylidae." London. 4vo.
- 1936a. "Dr. Karl Jordan's Expedition to South-West Africa and Angola: Herpetological Collections." *Novit. Zool.*, **40**, pp. 115-146, figs. 42-43.
- 1936b. "Reptiles and Amphibians collected by the Lake Rudolf Rift Valley Expedition." *Ann. Mag. Nat. Hist. (10)*, **18**, pp. 594-609, figs. 1-13.

ROUX, JEAN

1936. "Reptilia et Amphibia." in Jeannel, R., "Mission Scientifique de L'Omo." **3**, pp. 167-190, figs. 1-4. Paris. 4vo.

SANDERSON, I. T.

1936. "The Amphibians of the Mamfe Division, Cameroons. — (2) Ecology of the Frogs." *Proc. Zool. Soc. London*, pp. 165-208, figs. 1-8, pl. i.

SCHMIDT, K. P.

1919. "Contributions to the Herpetology of the Belgian Congo based on the Collection of the American Museum Congo Expedition 1909-1915. Part I. Turtles, Crocodiles, Lizards and Chameleons." *Bull. Amer. Mus. Nat. Hist.*, **39**, pp. 385-624, figs. 1-27, pls. vii-xxxii.
1923. "Contributions to the Herpetology of the Belgian Congo based on the Collection of the American Museum Congo Expedition 1909-1915. Part II. Snakes." *Bull. Amer. Mus. Nat. Hist.*, **49**, pp. 1-148, figs. 1-15, maps. 1-19, pls. i-xxii.

THOMAS, H. B. and SCOTT, ROBERT

1935. "Uganda." London. 8vo.

EXPLANATION OF PLATES

PLATE 1

PLATE 1

Map of eastern Uganda and of Kenya Colony.

Designating the principal collecting camps mentioned in the itinerary. Except on the diagrammatic inset of the camps on Mount Elgon, railways are indicated by dotted lines. Landing at Mombasa, Loveridge took the railway to Kitale, thence by motor lorry through Kacheliba to Karita River from which a foot *safari* was made to Mounts Debasien and Elgon. Thence by truck from Bukori to Kaimosi, and afterwards on through Molo and Kikuyu to Nairobi.

The second part of the trip included visits to Kibwezi, Tsavo and Voi by rail, thence by truck to Mount Mbololo and back to Voi, rail to Mombasa, truck northwards along the coast to Mkowe, dhow to Lamu and Manda Islands, boat to Kililana and Mkonumbi, *safari* to Lake Peccatoni, Witu, Kau. Here four dugouts were procured for the journey up the Tana River to Wema in Ngatana. Returned down the river to Golbanti from whence a *safari* was made through Karawa and Gongoni to Malindi, where a truck was procured for the journey back to Mombasa.

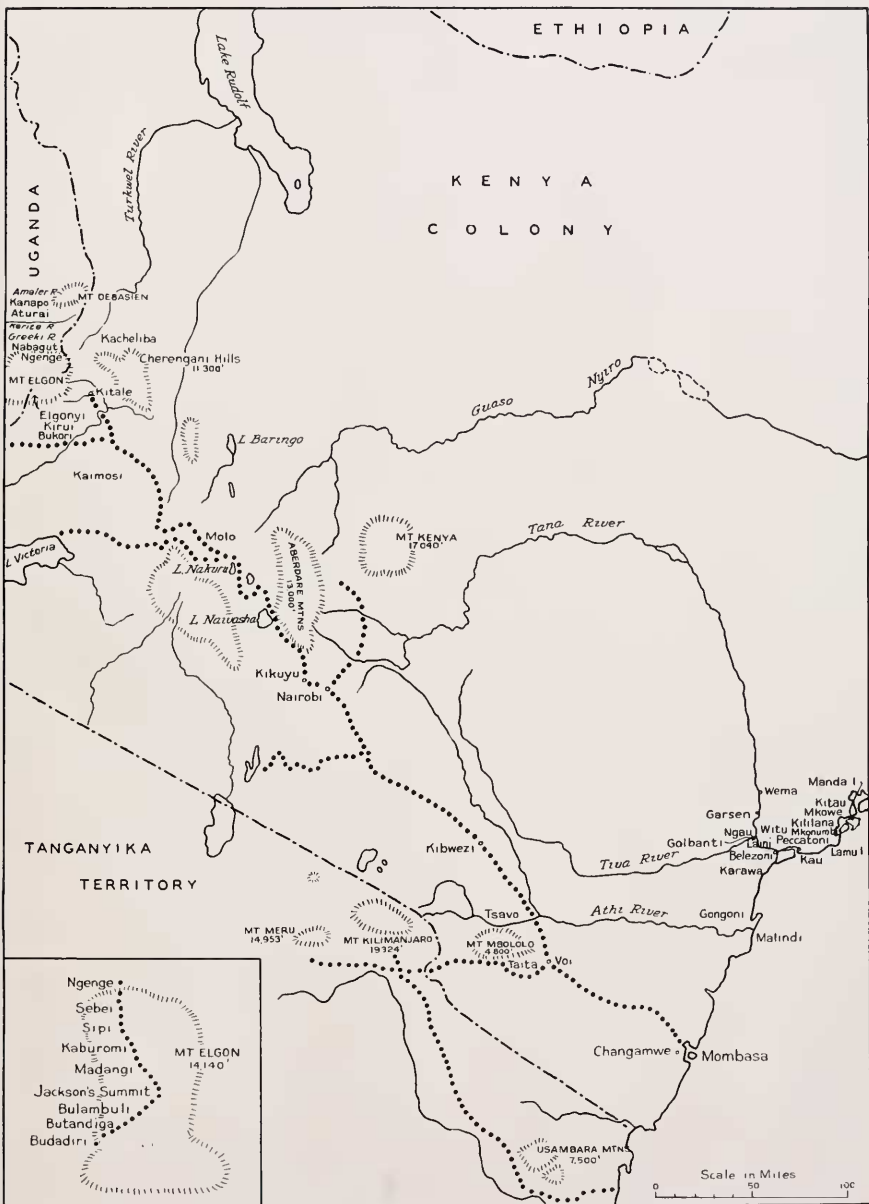


PLATE 2

PLATE 2

Fig. 1. A watercourse on Mount Debasien, Uganda.

With the single exception of the Amaler River, the illustration is typical of the state of all riverbeds on the western slopes of the mountains. Fully appreciative of the important part played by forests in the conservation of rainfall, the Uganda Government is carefully conserving the remnant of rain forest surviving on the summit of Mount Debasien. To the destruction of forest in the past, however, may be traced the swift run off which leaves a dry and stony watercourse throughout the greater part of the year.

Fig. 2. The Amaler River on western Mount Debasien.

This small stream provided the only running water on the western side of the mountain at the time of our visit in November 1933. In parts of its course the Amaler River was fringed with gallery forest, the resort of monkeys and a few surviving sylvicoline forms such as the gecko *Cnemaspis quattuorseriatus* of Kivu and Kenya. Six other watercourses which were visited were dry and stony beds where runner grass was a menace to the unwary walker. Both photographs were taken within fifty yards of our camp at 5,000 feet.



1



2

PLATE 3

PLATE 3

Fig. 1. Upland Savanna at 6,000 feet on Mount Debasien.

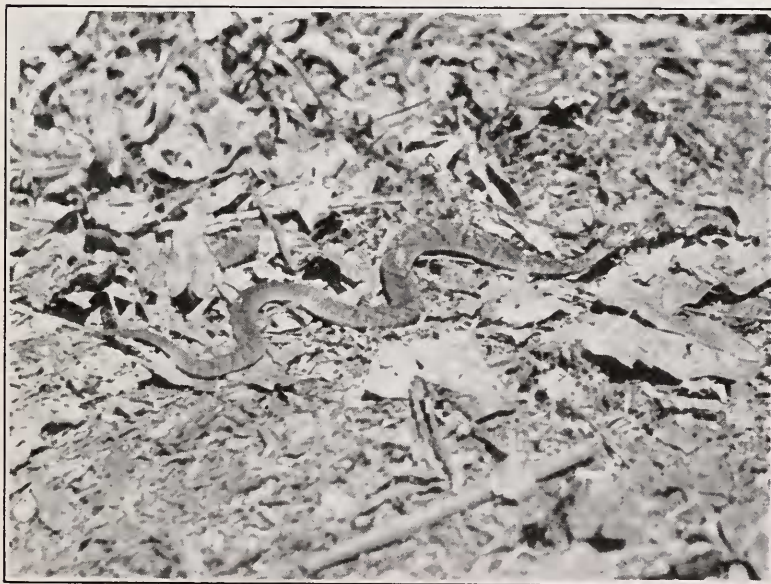
Much of the mountain's western slopes are covered with xerophilous vegetation consisting of a rank growth of grass, eight or more feet in height, and scattered, stunted trees. During the long dry season, the scorching rays of the equatorial sun extract all moisture so that a devastating conflagration occurs when the vegetation is fired by the native pastoralists. In East Africa this type of country is slowly replacing the cool and humid forests whose sylvicoline fauna is being supplanted by the less specialized types common to the savanna.

Fig. 2. A Green Adder (*Causus resimus*) at Kaimosi, Kenya.

This snake forms one of a small group of dominant species whose habitat is anomalous for they occur through several zones such as the coastal, savanna and rain forest. Perhaps swamps with an abundant supply of frogs are the governing factor in its distribution. The Green Adder ranges from Angola through the Central Lake Region across to the northeast coast. We captured several in the swamps at Mkonumbi, near Lamu, where they, like us, were in search of frogs. One had recently swallowed two of the allegedly aposematic *Phrynomerus bifasciatus*, whose black and scarlet livery is correlated with a secretion which acts as a powerful irritant.



1



2

PLATE 4

PLATE 4

Fig. 1. Cattle watering at the forest edge at Kaimosi, Kenya.

Owing to the foresight of Mr. F. N. Hoyt of the Friends Africa Mission a fine stand of virgin timber is being conserved on the mission property, while destruction of forest has been going on round about as the corollary of native immigration and settlement. The region, including the Kakamega forest, is of great zoölogical importance as being the eastern limit of the range of many West African forest creatures and type locality of eastern forms.

Fig. 2. Logging at Kaimosi, Kakamega, Kenya Colony.

At intervals all day long primitive ox-waggons went groaning past camp as they carried dismembered forest giants to the sawmills. There they were to be converted into the pit props and planks demanded by the thriving young gold-mining industry nearby. Africa is fast following in the footsteps of Europe and America in the exploitation of her forests, and it is poor consolation to the zoölogist to know that gums and blackwattle are being planted as a future fuel supply. Such plantations do not save the characteristic fauna which, for the most part, perishes with the primary forest.



1



2